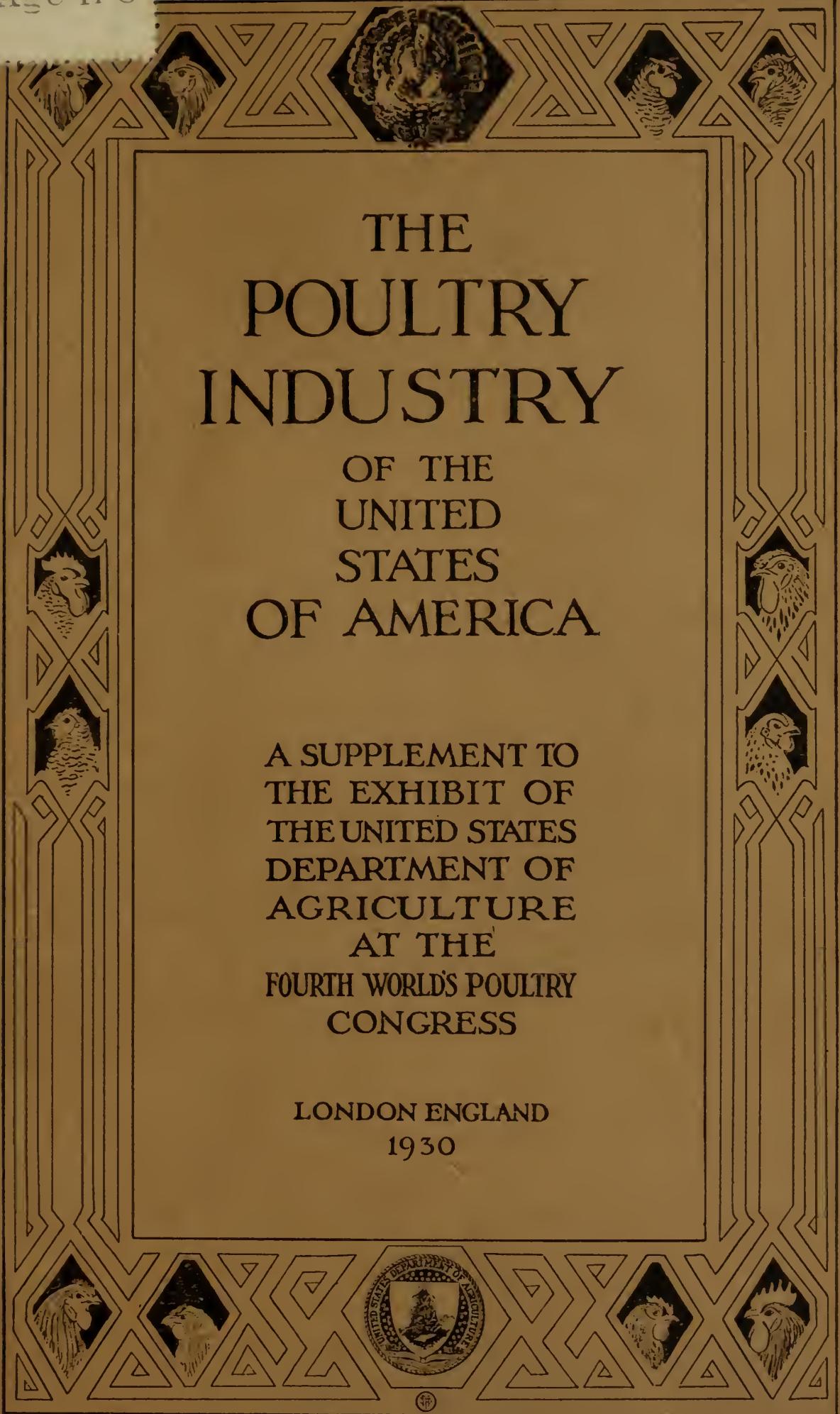


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# THE POULTRY INDUSTRY OF THE UNITED STATES OF AMERICA

A SUPPLEMENT TO  
THE EXHIBIT OF  
THE UNITED STATES  
DEPARTMENT OF  
AGRICULTURE  
AT THE  
FOURTH WORLD'S POULTRY  
CONGRESS

LONDON ENGLAND  
1930

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THE POULTRY INDUSTRY  
OF  
THE UNITED STATES  
OF AMERICA

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A Special Report  
Supplementing the Exhibit  
of the United States Department of Agriculture  
at the Fourth World's Poultry Congress  
London, 1930



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## FOREWORD

By ARTHUR M. HYDE, *Secretary of Agriculture*

THIS booklet carries the greetings of the United States Department of Agriculture to the Fourth World's Poultry Congress. The people of the United States are keenly mindful of the fact that its extensive poultry industry traces back to fowls imported from many parts of the world. From small beginnings, often under pioneer conditions, poultry raising has developed into one of the important resources of the Nation. Organization and modern business principles have largely superseded the early primitive methods. Also, as an avocation, the breeding of fine specimens of feathered stock has evoked the best efforts of city and country dwellers alike.

The future welfare of this great industry is so closely linked with technical, educational, and commercial developments in other countries that the United States seeks the inspiration that arises from poultry discussions of international scope. The World's Poultry Congress admirably provides this opportunity by which all countries may give and receive information.

As a supplement to the exhibits from the United States this booklet seeks to present facts of interest regarding the production, marketing, and uses of poultry and their products in this country. More specialized information is readily available in the department's technical and popular publication series. The United States Department of Agriculture also cordially welcomes the visits of foreign scientists to its laboratories, offices, and experimental farms.

I trust that all these contacts may lead to increasingly close understanding and friendly relations.

# THE POULTRY INDUSTRY OF THE UNITED STATES

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## INTRODUCTION

The poultry industry of the United States is a widely distributed and diversified activity. Poultry products are more universally produced than any other agricultural product. Over one-third of the total poultry population of the world is to be found in the United States, there being about five fowls raised annually for every person, which is a much higher proportion than in most other countries. There are very few farms that do not have a small flock of poultry, and thousands of small flocks are kept in the small yards of homes in towns and villages.

## EXTENT AND VALUE OF THE POULTRY INDUSTRY

There are estimated to be more than 6,000,000 separate flocks of poultry in the United States, including nearly 5,500,000 flocks on the farms. Poultry is raised on more than 86 per cent of the farms of the country. About 85 per cent of the fowls are raised on general farms in flocks of 50 to 400 hens, principally in the grain-producing North Central States.

The number of chickens on farms in 1929 was about 442,000,000, with a value of \$403,000,000. The income from chickens and eggs amounted to about 10 per cent of all farm income in 1928, being estimated at \$717,000,000 for eggs and \$458,000,000 for chickens, or a total of \$1,175,000,000 out of a total income of \$11,827,000,000 from farm production. Poultry products were exceeded in value in 1928 by only four other farm products—corn, milk, swine, and cotton. Over two and a half billion dozen eggs and more than a half billion chicks are produced annually.

The poultry industry of the United States represents on the one hand a widely distributed enterprise supplemental to general farming, and on the other hand a high degree of specialization in commercial plants. In producing sections near the larger cities on the Atlantic seaboard and in the Pacific Coast States of California, Oregon, and Washington, there are areas in which commercial poultry production predominates. (Figs. 1 and 2.) In other localities, the keeping of poultry for breeding stock and for the production of eggs for hatching is important, the baby chicks being sold to those who keep both large and small flocks for commercialized egg production.

Throughout the farm-production areas as well as in the commercial poultry districts are many highly specialized egg-packing plants, poultry-feeding and slaughtering plants, poultry-canning plants, and egg-breaking plants, while cold-storage warehouses are devoted to an important extent to the storing of poultry products.

Although the industry is made up primarily of producers and handlers of chickens and chicken eggs, the turkey, duck, and goose production is also important. Few products are as widely distributed and consumed as poultry meat and eggs.

The poultry industry has developed from a small beginning when the first settlers brought fowls to North America, and the production of poultry for meat and eggs has been an important source of food



FIGURE 1.—A highly developed poultry-farm district on the Pacific coast. Practically every farm in this picture has from 1,000 to 2,000 hens

supply for the cities for over 100 years. The commercial development of plants devoted to poultry raising alone began about 1870, and thereafter increased attention was given to breeding, feeding, and management. In about 1873 standards were developed, and in 1874 the first Standard of Perfection was printed. Beginning about the year 1890, hatching in incubators on a large scale developed, and in 1916 the International Baby Chick Association was organized.

In the early history of the poultry industry the egg market offered the main stimulus to better methods. In this land of abundant meat supplies, eggs were more of a luxury than poultry. Until the development of cold storage, marketing was limited by the lack of means of preservation. Eggs were often preserved by immersion in limewater and were sometimes preserved in ice houses. As facilities became available, cold storage came into more general use as a means of

preserving the surplus production of the spring months for consumption in summer and fall. The introduction of the 30-dozen egg case to displace the barrel as a package for eggs, which occurred about 1880, was a considerable economy. The production of dressed poultry for market was greatly stimulated by the use of refrigeration for transportation and storage.

Poultry raising occupies an important place in the organization of North American farms. Not only is poultry raised on about 90 per cent of the farms, but on many farms poultry products are one of the best paying products. Poultry utilize large quantities of waste products, including grains and meat food, which could hardly be utilized as efficiently as in the production of eggs and poultry meat. Poultry

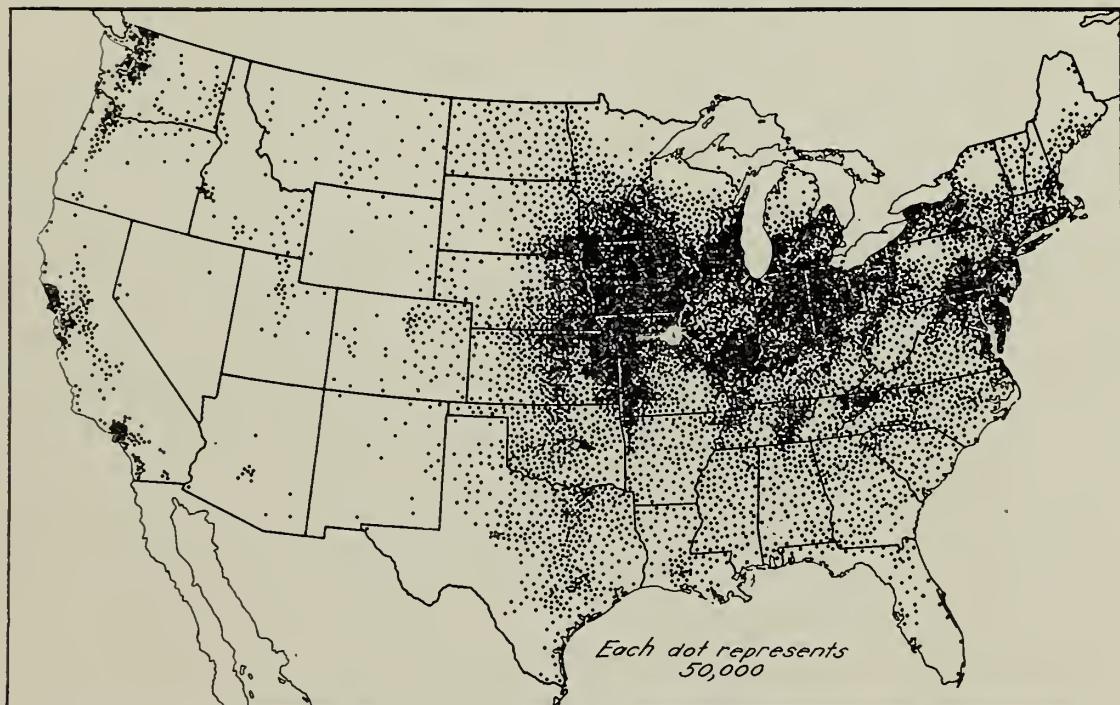


FIGURE 2.—Chickens on hand January 1, 1925. The area of heaviest production lies in the North Central and the North Atlantic States. Small localities of heavy production occur in California

are foragers and attain a part of their living from grass and other green food and insects. The raising of poultry utilizes labor and is a source of cash returns for practically every month of the year. Furthermore, eggs and poultry meat contribute an essential variety to the diet of the farm-home table and, in addition, reduce the necessity for the purchase of other meats.

The value of eggs represents about 57 per cent and the value of poultry meat about 43 per cent of the total value of all poultry products. Chickens contribute about 95 per cent of the value of all poultry products and are the only class of poultry raised extensively for the production of eggs, all other classes being raised primarily for the production of meat.

### Distribution of Poultry Production

The more important egg and poultry-meat-producing areas of the United States can be divided according to their geographical location and the character of the industry into three fairly distinct regions.

The first region comprises principally the States lying in the Mississippi Valley, including Minnesota, Wisconsin, Michigan, Ohio, Indiana, Illinois, Iowa, Nebraska, Kansas, Oklahoma, Missouri, Kentucky, Tennessee, and Texas. This extensive region produces an enormous quantity of eggs and poultry meat, the great bulk of which is produced on grain and stock farms. Comparatively few are specialized for commercial poultry farms; but the total of poultry production is far in excess of the requirements for home consumption, so that a large proportion is marketed in the eastern consuming centers.

The second region comprises the Northeastern States, including the six New England States, New York, Pennsylvania, New Jersey, Maryland, and Delaware. In this region the poultry industry is one of major importance in agriculture, and many large and specialized poultry farms have been developed. At the same time, because of the very high proportion of the consuming population living in this region, the supply of poultry products from within the region is wholly inadequate to meet the demand, and large quantities of eggs and poultry meat are shipped in from other more extensive producing regions.

The third region comprises the Pacific Coast States. In this region commercial poultry farming has been developed extensively, and increasing quantities of eggs are shipped to the East annually.

Eggs of all domesticated poultry are produced for market, but probably 99 per cent of the total produced in the United States, and as large a proportion of the imports, are eggs produced by chickens. (Fig. 3). Production and trade in eggs of turkeys, guinea fowls, ducks, and geese are of only negligible importance.

Eggs enter consuming channels chiefly in the shell form and as such are consumed primarily in households, although bakers and confectioners also use considerable quantities in the shell. Very few eggs other than those in the shell pass through the familiar culinary outlets. Egg products are consumed mainly by wholesale bakers and by confectioners. Of these, the frozen products serve largely as an ingredient of cakes and salad dressings, while dried eggs find their outlet chiefly in the baking of pies, sweet specialties, and confections.

Considerable dried albumen and some dried yolk and mixed egg are also used in the arts. Liquid egg, yolk or albumen, treated with chemical preservatives, mainly boric acid, is also used. This industrial outlet is of value in the disposal of eggs which have become unfit for food. Some liquid yolk and mixed eggs, as well as some dried

egg or yolk, are consumed in tanning. Egg-yolk oil is used in dressing glove leather and in bookbinding. Dried albumen is used for finishing glazed leather, in chrome tanning of skins, and as a mechanical fixing agent in textile dyeing, particularly in printing delicate tints for which blood albumen is not suitable. Other uses are as a fixing agent for pigment colors, as an adhesive, as a sizing for paper, by bookbinders in gilding books, in making printers' ink, for thickening inks, and in clarifying wines.

### USES OF POULTRY PRODUCTS

Among the animal products used for human food few have been longer or more widely known in the United States than poultry. The kinds of poultry contributing chiefly to the poultry-meat supply of

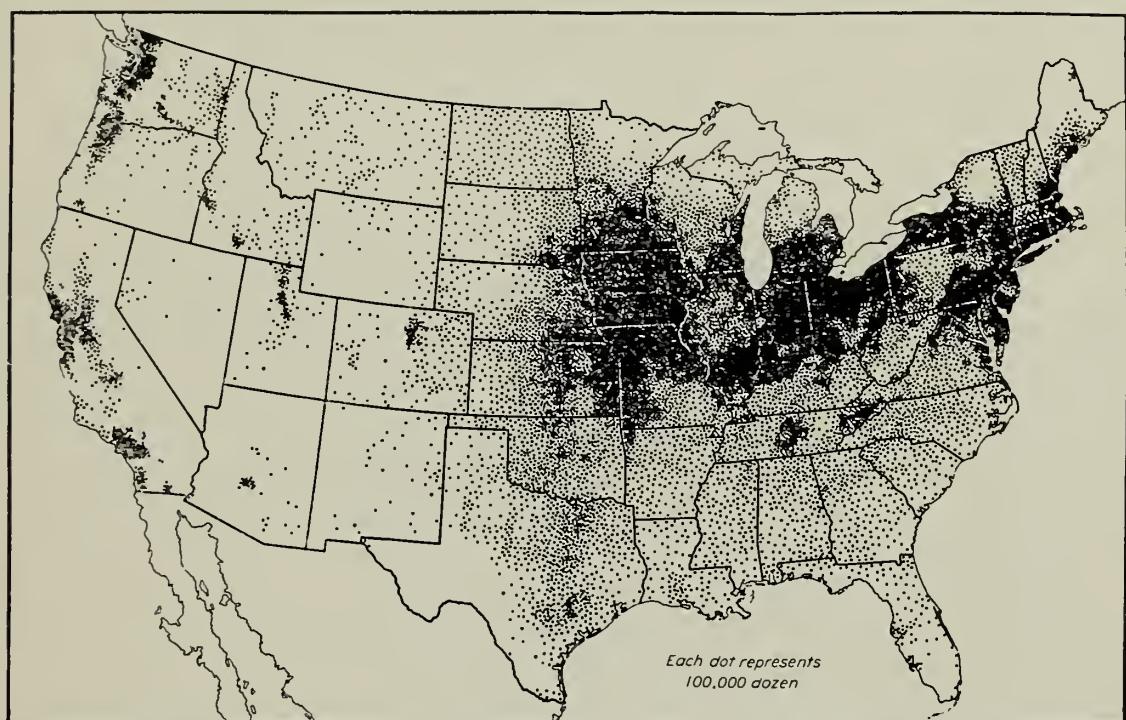


FIGURE 3.—Eggs produced during 1924. The areas of greatest production of eggs correspond to the areas of heaviest production of chickens

this country include chickens, turkeys, guinea fowls, ducks, and geese. Because of the relatively greater number of chickens raised annually in the United States, by far the largest part of the poultry meat consumed is provided by chickens. Turkeys, geese, ducks, guinea fowls, and pigeons follow in the order named. Practically all poultry meat and pigeon meat is used as food.

Eggs have an important and distinct place in the American diet because of their nutritive value and the ease with which they can be prepared in a variety of attractive ways. The people in the United States respond to the fact that, like meat, the protein content of eggs is high; and that, like milk, they contain most of the essentials for growth and repair of body tissues. These facts have been given wide publicity and are fairly generally known. Hospitals, of course, are large buyers of eggs.

As in other countries, eggs are frequently used for children because of the presence of the antirachitic vitamin, for patients with gout and similar troubles because eggs are low in purin-forming components, and for undernourished persons because of the readily available form of the tissue-building and energy-producing nutrients. The quantity used by well people, in general walks of American life, is controlled somewhat by the price and varies somewhat with the season.

Eggs may be said to form one of the main dishes at breakfast. Bacon and eggs, or ham and eggs, have been called the standard breakfast dish in this country. The breakfast egg may be soft cooked, scrambled, poached, or fried, or made into an omelet. Eggs make a frequent center dish for luncheon. They are an ingredient in many of the complex dishes at dinner, literally from the soup to the dessert course, and are used for garnishing as well. Besides the main dishes and their sauces, they are used in soufflés, in salads and salad dressings, in cakes, icings, custards, candies, and ice cream.

### Poultry Meat in the Diet

Chicken has long been a favorite dish for American tables on Sundays, holidays, and guest days. Our methods of cooking poultry usually depend on the age and quality of the birds. Older birds are given long, slow cooking with water to make them tender. Younger birds are often roasted without preliminary cooking, to develop the desirable flavor brought about by browning, and very young birds are quickly cooked by broiling, directly over the fire or in a pan, or by frying.

Since the lean meat of poultry is considered rather dry and lacking in fat, other fat is frequently added in cooking and serving. Slices of bacon are often laid over a fowl that is to be roasted, and broilers are usually covered with butter or other fat before they are cooked. The popular dish known as Maryland fried chicken includes slices of crisp bacon, corn fritters, and a cream gravy, all of them rich in fat. Cold chicken is often used in salad with a rich dressing, or warmed again in a rich cream sauce.

Americans like to combine the delicate flavor of chicken with other flavors. For example, savory herbs, oysters, or chestnuts are used in stuffing and sweet peppers or mushrooms are used in sauces. By skillful blending of such flavors, poultry is made the basis of a great variety of dishes.

The fact that poultry meat has valuable nutritive qualities is not overlooked in this country, but plays an important part in the industry. Dressed poultry is often bought by the consumer because of its value as a food for invalids and children. That it is one of the chief substitutes for beef, mutton, and pork accounts for the sale of large quantities, especially during Lent.

The price of poultry varies considerably with supply and demand. In general the older fowls are cheapest in price per pound. Capons are always more expensive. Broilers and fryers are expensive if considered in relation to their quantity of edible meat, especially in the early spring, but to the average American nothing quite takes their place on the bill of fare. The price of turkey is stimulated by holiday demands, and it can be purchased for less after the season is over. Squabs are usually bought as luxuries. Ducks, geese, and guineas are not so generally available and the prices are subject to greater fluctuation. Storage fowls in large centers are cheaper than freshly killed stock because of greater convenience in handling. All forms of live poultry are cheaper in the fall than in the spring.

Consumers in this country are gradually becoming more informed regarding grades, price variations, and the reasons therefore, and advantageous method, of buying and serving.

### **Roast Turkey and Fried Chicken Typical American Dishes**

The popular ways of cooking and serving poultry and eggs the world over are represented in the cosmopolitan food customs of the United States. In addition, though, to the many delicious recipes which had their origin in England, France, and other Old World countries, there are some typically American dishes. As the *pièce de résistance* for dinner on Christmas and other special occasions during the winter, for instance, nothing is considered quite equal to roast turkey (fig. 4), and fried chicken (fig. 5) is a year-round favorite.



FIGURE 4.—Roast turkey filled with chestnut stuffing served with cranberry jelly

#### **ROAST TURKEY WITH CHESTNUT STUFFING**

|   |                                 |
|---|---------------------------------|
| 10 to 12 pound young turkey.  | 2 cups chopped celery and tops. |
| 1 pound large chestnuts.  | 6 cups fine, dry bread crumbs.  |
| $\frac{1}{2}$ cup butter, or $\frac{1}{4}$ cup butter and $\frac{1}{4}$ cup turkey fat. | 2 teaspoons salt.               |
| $\frac{1}{2}$ cup minced onion.   | $\frac{1}{4}$ teaspoon pepper.  |
| $\frac{1}{4}$ cup chopped parsley.  | 1 teaspoon savory seasoning.    |

Draw and singe the turkey, remove the oil sac and pinfeathers, cleanse thoroughly, and wipe dry. Cook the chestnuts in boiling water to cover for 20 minutes, remove the shell and brown skin while hot, and chop into medium-sized pieces. Melt the butter in a skillet, cook the onion, parsley, and celery for two or three minutes, and stir frequently. Combine the bread crumbs, chestnuts, salt, pepper, and savory seasoning, add to the celery mixture, and stir until thoroughly mixed and hot. Sprinkle the inside of the turkey with salt, and fill with the hot stuffing, but do not pack. Fold the wings back on the neck. Tuck the legs into a band of skin and flesh below the tail, or tie them down. Sew the cut surfaces so that the stuffing will not fall out or become moist when basted. After the turkey is stuffed and trussed, rub the surface with butter, sprinkle with salt, pepper, and flour, lay a piece of fat over the breastbone, and put on a rack in an open roasting pan.

Place in a hot oven (about 450° F.) to sear for 30 minutes. Reduce the oven heat to moderate (350°) and continue to roast for about 2½ hours longer. Baste occasionally with the drippings and turn the turkey first on one side and then on the other so that it browns well all over. Test for "doneness" by piercing one of the thighs as it lies near the breast, and if the juice does not show a red tinge the turkey is done. Another



FIGURE 5.—Fried chicken with its customary dish of chicken gravy

test is to lift the wing and see whether it will be easy to disjoint in carving. Serve on a large, hot platter, garnish with parsley or celery tops, and make sauce from the giblets and drippings.

#### FRIED CHICKEN

Select young, plump chickens. Remove pinfeathers, wash the chicken, draw, cut into pieces suitable for serving, and wipe dry. Sprinkle with salt and pepper and rub well with flour. In a heavy skillet, heat a generous quantity of well-flavored fat to just below the smoking point, put in the larger and thicker pieces of chicken so that each piece will be surrounded by the hot fat, partly cover, and watch closely to prevent scorching. Turn the chicken as soon as it becomes golden brown, reduce the heat, cook until tender, and drain on paper to absorb the excess fat. As the larger pieces are removed, add the smaller ones and all will be finished about the same time.

For gravy, to each 2 tablespoons of fat in the skillet allow 2 tablespoons of flour, cook for a few minutes, stir constantly, add 1½ cups of rich milk, and cook until thickened. Add more salt and pepper if needed, sprinkle finely chopped parsley over the gravy, and serve hot with the chicken.

## PRODUCTION METHODS WITH VARIOUS CLASSES OF POULTRY

### Chickens

About 96 per cent of all the poultry raised in the United States are chickens, the remaining number being made up of turkeys, ducks, geese, and other domestic birds. Commercial flocks are extensively raised in many States as well as smaller flocks kept on general farms. Commercial chicken raising involving large flocks has been most ex-



FIGURE 6.—The type of poultry house most commonly used on commercial poultry farms in the United States

tensively developed in the Middle Atlantic States and on the Pacific coast.

#### TREND OF DEVELOPMENT

An increase in knowledge of management and diseases and the fact that chickens may be kept successfully confined in buildings have made a great change in the size of flocks. Fifty years ago hens were kept chiefly in farm flocks of from 50 to 100 birds. Ten years later, farms with 500 hens were not uncommon. By 1900 there were many farms keeping 1,000 hens. This number had increased to 2,500 and even to 3,000 by 1925, and by 1929 there were a number of poultry farms with from 5,000 hens to several times that number. Intensive methods and large houses (fig. 6) are essential to the management of these large flocks. This development has led to the use of artificial lighting and heating, running water, and other labor-saving equipment (fig. 7) adapted to intensive conditions and big laying houses.

In some cases large dairy barns have been remodeled into 2-story or 3-story poultry houses. A few houses of 4 or more stories have been

constructed. (Fig. 8.) Direct sunlight is provided through open windows or by the use of glass substitutes which admit part of the ultra-violet rays of the sun.

Cod-liver oil is widely used for poultry which is kept indoors. Outside sun porches with wire floors are built on to some of these large houses and are also used with many small poultry houses, both for chicks and for hens. Portable houses (fig. 9) are common equipment on many general farms.

Various branches  
of the commercial

FIGURE 7.—Labor-saving devices help to reduce labor costs on poultry farms. A dry-mash hopper is shown on the left, water fountain with platform, center, and a feed and litter carrier at the right in front of the door

poultry industry have expanded tremendously in recent years. Hatcheries, some of which have a capacity of over 1,000,000 eggs,

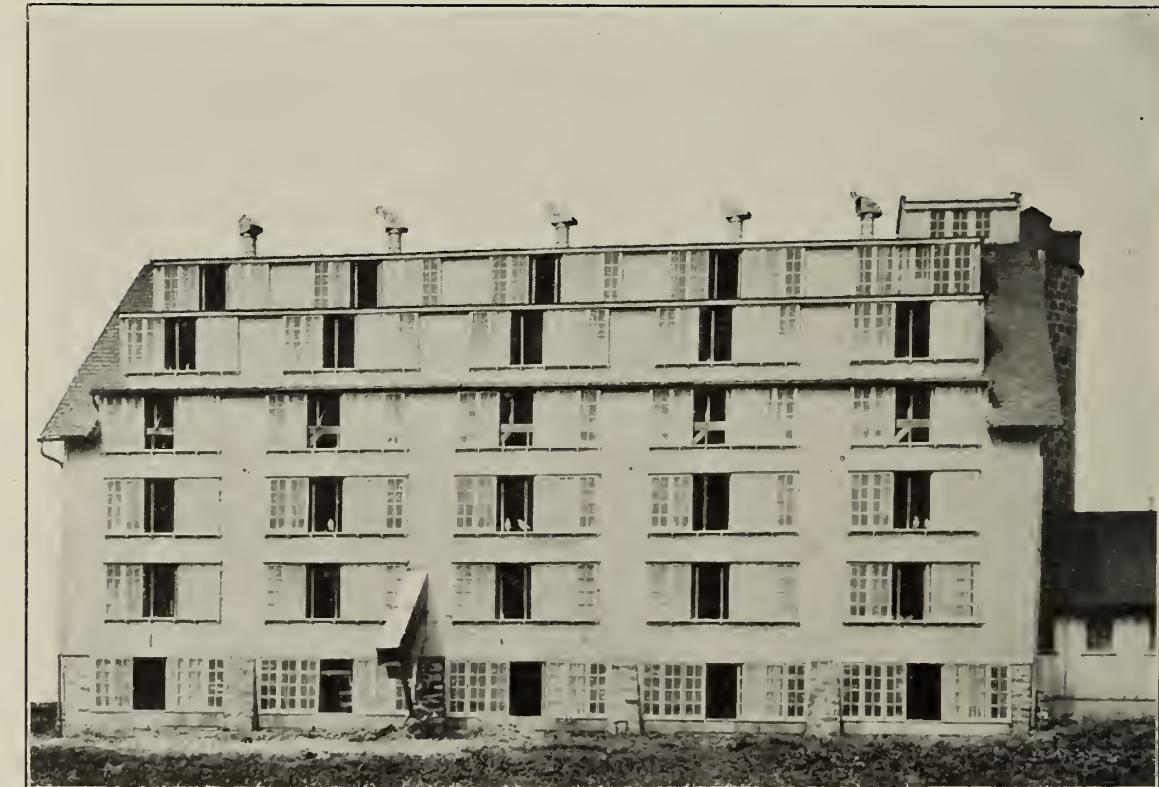


FIGURE 8.—A large barn converted into a 6-story poultry house for keeping a large commercial flock under confinement

now hatch and sell about three-fourths of a billion chicks each year. Large hatcheries have been developed in all sections of the country, but this phase of the work has grown to the greatest extent in the

Central West, in the Northeast, and on the Pacific coast. The hatcheries employ agents to select and cull the breeding flocks from which they receive their hatching eggs. A partial survey, made in 1929, indicates that about 60 per cent of all chicks produced in this country are hatched and brooded artificially. Artificial-brooding methods are commonly used in the larger flocks. The extensive use of incubators and brooders enables poultrymen to raise chicks early in the year, thus having laying pullets in the fall when egg prices are high. (Fig. 10.)

Commercial ready-mixed poultry feeds are produced and sold throughout the United States. Most of the large feed companies



FIGURE 9.—Colony laying house built on runners so that it can be easily moved. This type of house is used on many general farms

have extension poultry workers who devote all their time to promotion of the poultry industry. Other commercial poultry interests, such as poultry publications, incubator and brooder companies, and manufacturers of general poultry equipment, play an important part in the development of the industry. Their exhibits constitute a large portion of the poultry shows (fig. 11). Railroad companies promote poultry raising in their respective areas by exhibits, demonstrations, and lectures. About 50 magazines, devoted entirely to poultry, are published in the United States in addition to farm and livestock periodicals which contain considerable poultry material.

#### BREEDS OF CHICKENS

A very large number of the breeds and varieties of chickens known throughout the world are raised to some extent in the United States. Most flocks are made up of such breeds as the Plymouth Rock,

Leghorn, Rhode Island Red, Wyandotte, Orpington, Ancona, and Jersey Black Giants. (Figs. 12-16.) There is a general preference for breeds of the American class on farms where both eggs and meat are desired and where there is an abundance of range. The White Leghorn, by far the favorite variety of the Mediterranean classes, is the breed commonly kept in commercial flocks. The chickens kept on commercial poultry farms and a large percentage of those raised on general farms are purebred. The development of the hatchery industry has greatly increased the proportion of purebred flocks and there has also been an increased demand for high egg-producing stock. Interest in crossbred poultry is comparatively small.

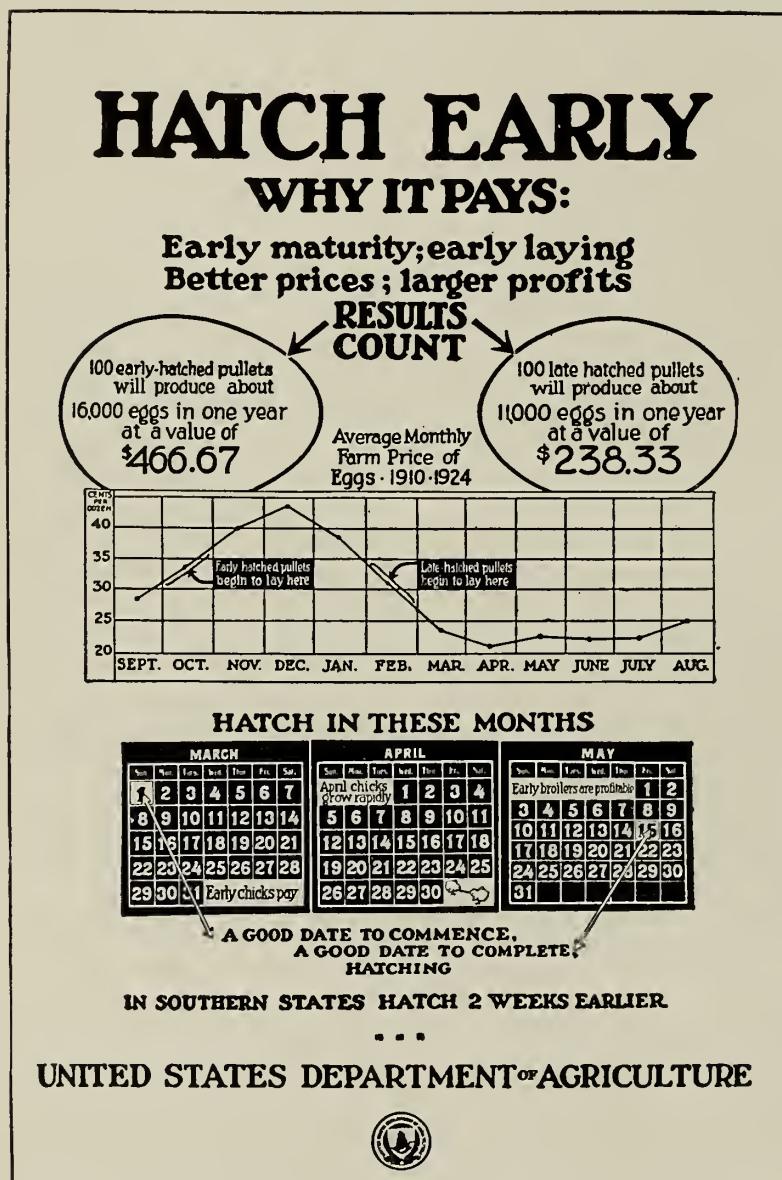


FIGURE 10.—An educational chart used in the promotion of better management of flocks, showing the value of early hatching

tions have been compiled, and the averages are given in Table 1 which shows the weight of two breeds of chickens and the quantity of feed consumed per chick until the cockerels were sold as broilers and the pullets were ready for the laying houses.

In connection with the data in Table 1, one should consider that weights depend considerably on whether the chicks are reared for breeding stock or are forced for market. The broiler weights are of chickens fed for market at the United States Animal Husbandry

#### COST OF RAISING CHICKENS

Feed is usually the largest item in the cost of raising chickens and is the factor on which the most data are available. Labor, housing, and fuel costs are also important items. Records from demonstration flocks and from poultry farms, keeping records in cooperation with State agricultural colleges, have provided valuable data on the cost of raising chickens.

The results of a number of these demonstra-

Experiment Farm, near Washington, D. C. The remaining figures are from a report of the Connecticut Agricultural Experiment Station. From 20 to 25 pounds of feed are required to grow a Leghorn chicken, and from 25 to 35 pounds to grow one of the Rhode Island Red or Plymouth Rock breed to laying age.

TABLE 1.—*The average weight of White Leghorn and Rhode Island Red chicks, by weeks, and the average quantity of feed consumed per chick, when raised for breeding and for market purposes*

| Age      | White Leghorns           |          |   |          | Rhode Island Reds        |          |   |          |
|----------|--------------------------|----------|---|----------|--------------------------|----------|---|----------|
|          | Average weight per chick |          | Average quantity of feed consumed per chick |          | Average weight per chick |          | Average quantity of feed consumed per chick |          |
|          | Broilers                 | Breeders | Broilers                                    | Breeders | Broilers                 | Breeders | Broilers                                    | Breeders |
| 4 weeks  | Pounds                   | Pounds   | Pounds                                      | Pounds   | Pounds                   | Pounds   | Pounds                                      | Pounds   |
| 4 weeks  | 0.53                     | 0.38     | 1.25  | 0.79     | 0.61                     | 0.36     | 1.25  | 0.81     |
| 8 weeks  | 1.53                     | 1.09     | 3.47  | 2.32     | 1.84                     | 1.23     | 3.23  | 2.61     |
| 12 weeks | 2.53                     | 1.80     | 4.60  | 3.75     | 2.97                     | 2.30     | 4.09  | 4.21     |
| 16 weeks | 3.21                     | 2.36     | 4.58  | 4.35     | 3.80                     | 2.91     | 4.75  | 4.93     |
| 20 weeks |                          | 2.90     |   | 5.43     |                          | 3.68     |   | 6.35     |
| 24 weeks |                          | 3.28     |   | 5.49     |                          | 4.30     |   | 6.86     |
| Total    |                          |          | 13.90                                       | 22.13    |                          |          | 13.32                                       | 25.77    |

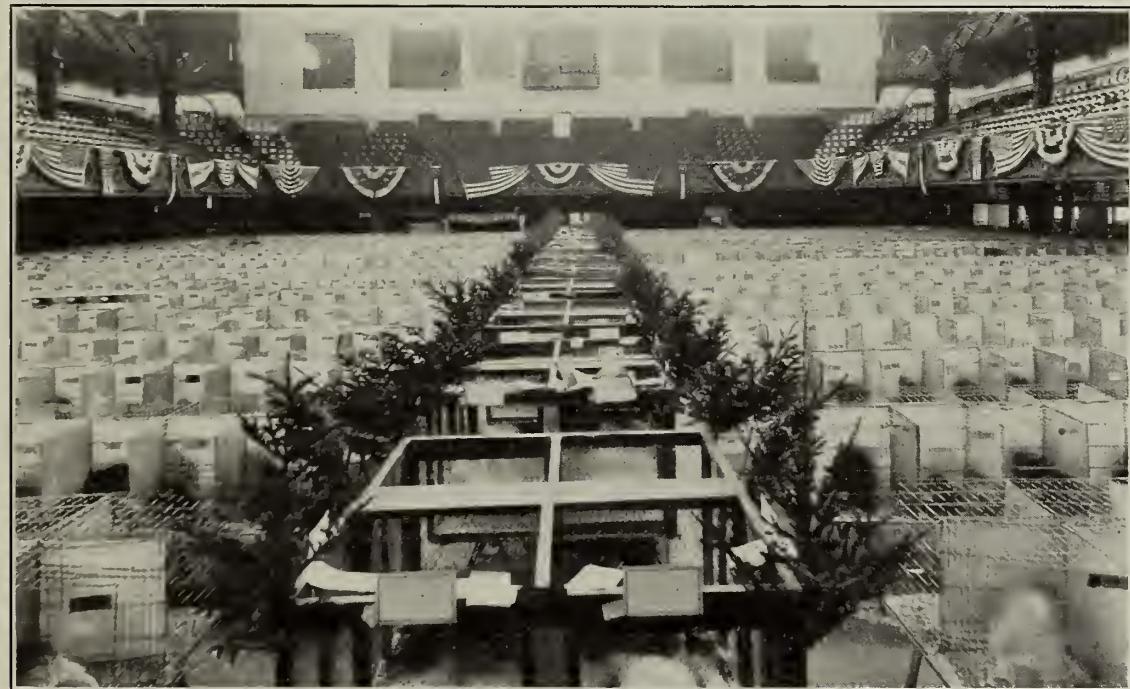


FIGURE 11.—A typical winter poultry show in the United States. Extensive poultry exhibits are held likewise at the State agricultural fairs during the fall months

Feed, labor, average number of eggs produced, and investment are all important factors affecting the cost of producing eggs. These factors vary from year to year and are greatly influenced by individual conditions. Feed makes up from 60 to 70 per cent of the total cost of egg production. The amount of feed consumed is affected by the size of the breed and by the number of eggs produced. Leghorn and similar breeds consume less feed than the larger, general-purpose breeds, such as the Plymouth Rocks and Rhode Island Reds.

The quantity of feed required to produce a dozen eggs is greatly affected by the number of eggs laid. Since Leghorns eat less feed than the general-purpose breeds, they usually consume somewhat less feed per dozen eggs produced. In Leghorn flocks hens averaging from 150 to 160 eggs per year consume from 70 to 85 pounds of feed in a year, whereas hens of the general-purpose breeds producing

an equal number of eggs eat from 80 to 95 pounds of feed. Pullets consume less feed per dozen eggs than do yearling or older hens. A flock of Leghorn pullets and hens producing an average of about 150 eggs per hen in a year eats about 6 pounds of feed per dozen eggs, and a similar general-purpose flock eats about 6½ pounds of feed.

Figures on feed cost of egg production and on number of eggs produced are given in Table 2. The table shows briefly that the average

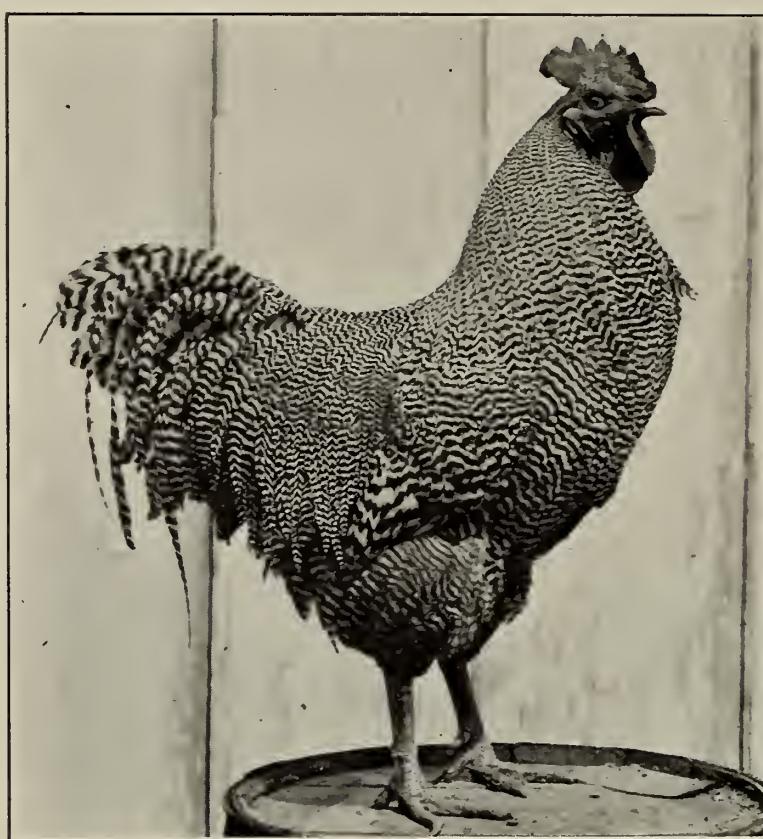


FIGURE 12.—A Barred Plymouth Rock, male, an American breed which is very popular on general farms in the United States

production per hen on poultry farms in New Jersey, including both hens and pullets, was about 150 eggs; total feed consumed per hen, including miscellaneous feed, was 87.7 pounds; the cost of feed was \$2.40; and the return above feed cost was \$3.03. The charges represent only the cost of feed, including green feed and oyster shell.

TABLE 2.—*Egg production, feed consumption, and cost per bird in commercial flocks of White Leghorns in New Jersey*

| Year and month | Eggs produced |         |         | Feed     |         | Value of eggs | Return above feed cost |
|----------------|---------------|---------|---------|----------|---------|---------------|------------------------|
|                | Per pullet    | Per hen | Average | Quantity | Cost    |               |                        |
|                | Number        | Number  | Number  | Pounds   | Dollars |               |                        |
| 1927           |               |         |         |          |         |               |                        |
| November       | 10.4          | 1.4     | 7.4     | 7.5      | 0.177   | 0.350         | 0.173                  |
| December       | 11.4          | 2.7     | 8.5     | 7.3      | .188    | .363          | .175                   |
| 1928           |               |         |         |          |         |               |                        |
| January        | 12.3          | 8.6     | 11.0    | 7.4      | .195    | .442          | .247                   |
| February       | 13.2          | 11.4    | 12.6    | 7.5      | .201    | .420          | .219                   |
| March          | 16.0          | 16.0    | 16.0    | 7.9      | .218    | .487          | .269                   |
| April          | 16.2          | 16.7    | 16.4    | 7.7      | .215    | .493          | .278                   |
| May            | 17.1          | 17.8    | 17.4    | 7.6      | .220    | .515          | .295                   |
| June           | 15.6          | 15.8    | 15.7    | 7.2      | .207    | .475          | .268                   |
| July           | 15.5          | 15.7    | 15.6    | 7.2      | .210    | .537          | .327                   |
| August         | 13.7          | 14.1    | 13.8    | 7.1      | .201    | .550          | .349                   |
| September      | 9.9           | 9.3     | 9.7     | 6.7      | .185    | .471          | .286                   |
| October        | 6.3           | 3.1     | 5.8     | 6.6      | .182    | .334          | .152                   |
| Total          | 157.6         | 132.6   | 149.9   | 87.7     | 2.399   | 5.437         | 3.03                   |

Table 2 is based on records from commercial poultry farms keeping from 1,000 to 3,000 White Leghorn hens. The average number of birds in the laying flocks in the fall on poultry farms, operated by one man (fig. 17), is about 1,000 pullets and 500 hens. However, this number is reduced during the year by culling and by deaths so that the average for the entire year would be only about 1,200 birds. Only the cost of feed is considered in Table 2 and no charges are included for such items as labor, depreciation, or interest on investment. The investment in poultry farming varies greatly, especially in the value of land and of the owner's dwelling. A survey of a considerable number of poultry farms in the State of Washington showed an average investment of \$8.42 per hen, while a New Jersey poultry-farm survey showed \$12.73 per hen.

Records of a group of general-farm flocks (fig. 18) in the State of Missouri on which an average of 180 general-purpose fowls were kept, resulted in the following figures during the 4-year period, 1926-1929: Average number of eggs per hen, 130, 142, 150, and 147; return over feed cost, \$2.54, \$2.15, \$2.24, and \$2 per hen.

The close relation between return over feed cost and average annual egg production is shown in the figures of Massachusetts farms taken from a survey made by the Massachusetts Agricultural Experiment Station. Each additional 20 eggs in average production showed an increase of 60 cents or more in labor return per bird. With an average production of 120 eggs the labor return was \$1.81, while a 140-egg average gave a return of \$2.49, and 160 eggs per hen increased the labor return to \$3.09 per bird.

#### FEEDING

Mash and scratch grains are commonly fed both to hens and chicks, the mash usually being fed dry in hoppers. Dry-mash feeding in hoppers is a labor-saving method and permits inexperienced feeders to get good results. In some cases a light feed of moist mash is given in addition to the dry mash. The all-mash system, in which all the feed is provided in a ground form and kept before the poultry all of the time, is also used to a limited extent.

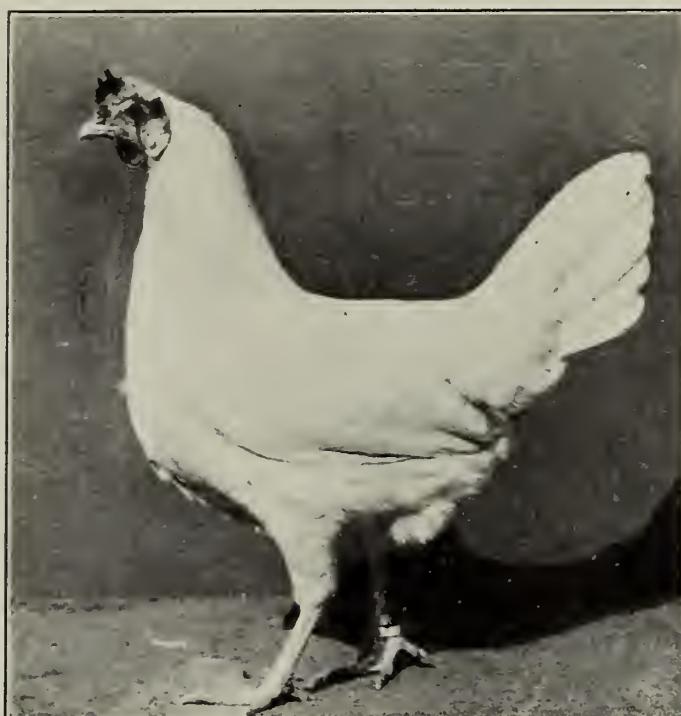


FIGURE 13.—A Single-Comb White Leghorn, female. This breed is kept on most of the commercial egg farms

Corn (maize) is the principal ingredient in poultry feeds, making up from 35 to 90 per cent of the scratch and from 20 to 60 per cent of the mash feed.

Wheat by-products, such as bran and middlings, make up about 30 per cent of the mash, while about 20 per cent of a high-protein feed, such as meat scrap or fish meal, is commonly used. Meat scrap is used much more generally than fish meal and is generally lower in price. Corn, wheat, and oats

FIGURE 14.—The Rhode Island Red, another breed which was produced in the United States. It is popular on general farms and is increasing in numbers on large poultry farms

are used in the scratch mixture and ground oats are used to some extent in the mash. Some form of milk is fed extensively to poultry, especially to young chicks. Buttermilk and skim milk are fed chiefly, either in liquid, powdered, or condensed form. The mash mixtures usually contain about 20 per cent total protein and the scratch mixtures about 10 per cent. Approximately equal parts of mash and scratch are used, giving about 15 per cent protein in the complete ration.

The importance of minerals and vitamins in the rations is generally realized. Bone meal is commonly used, and oyster shells and limestone grit are supplied as a source of calcium for the production of eggshells. Yellow-corn meal is preferred to white-corn meal because of its higher vitamin content.

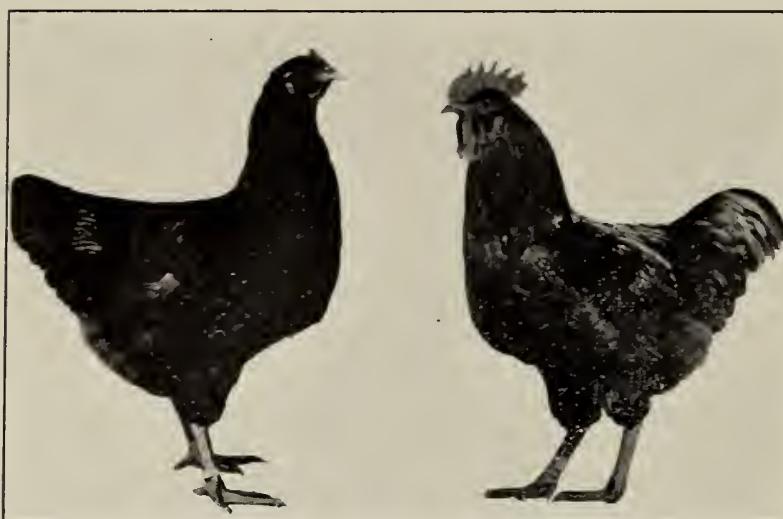


FIGURE 15.—A Jersey Black Giant, male. This is a comparatively new breed which was developed in the United States

Alfalfa-leaf meal and alfalfa hay are used extensively for their vitamin and mineral contents. Cod-liver oil has a very extensive sale for poultry feeding, especially in the feed for young chicks and for all poultry which is kept closely confined.

#### FATTENING CHICKENS

Chickens are fattened both at home and at commercial fattening stations. Home fattening is done only to a very limited extent and is largely confined to fattening broilers and roasters. Only those poultry raisers who have a fancy retail market find that it pays to give much attention to fattening. Much of the poultry raised on general farms is sold in a thin condition, and for many years hundreds of thousands of these growing chickens have been fed for short periods in commercial fattening stations. The chickens are usually fed a mixture of corn meal, oat-meal, and some form of milk, consisting of about 40 per cent grain and 60 per cent milk.

The common practice at commercial feeding stations, up to a few years ago, was to feed broilers for about two weeks, larger chickens being fed for a shorter period, roasters being fed for only one week. This feeding period has been materially shortened in the last few years and the chickens are now rarely fed for more than one week. The weight is increased in this short feeding period, but very little actual fat or fine finish is put on to the chickens. Records made by the United States Department of Agriculture of several thousand chickens at various commercial fattening stations showed that it required about 3.26 pounds of grain plus 4.9 pounds of buttermilk to produce 1 pound of gain in this short fattening period.

#### BREEDING

The egg production of hens has been greatly improved in recent years by improved breeding and selection and by the extensive use of males from high-egg-producing stock. Eggs are the principal product



FIGURE 16.—A Jersey Black Giant, female

of both the commercial poultry farms and of the general farm flocks. Interest in improving egg production is becoming greater each year as shown (1) by the 35 egg-laying contests (fig. 19) which are now in operation in various parts of this country, (2) by record-of-perform-



FIGURE 17.—A typical 1-man poultry farm in New Jersey. This farm has facilities for about 1,500 hens

ance associations which have been organized in about half of the States, and (3) by the widespread interest in the selection and culling of poultry. Trap nesting is largely confined to a small percentage of poultry farms, but careful selection for production and quality is



FIGURE 18.—A type of poultry house that is used by many general-farm owners who keep flocks of from 150 to 200 hens. This building has a concrete floor and a straw loft

practiced in most breeding flocks. The average egg production of all flocks in the Connecticut egg-laying contest is typical of the improvement in egg production in recent years. In 1929 this was over 200 eggs per hen while 10 years earlier the average was only a little over 150 eggs per hen. Special attention in breeding is given to selecting

fowls which lay in the fall and winter when the price of eggs is high. Hens 1 or 2 years old, or early hatched pullets which have been through a partial fall molt, are generally used for breeding. Flocks for market-egg production are usually composed of at least 60 per cent pullets while in many such flocks only pullets are kept.

Record-of-performance work conducted under official supervision is helping materially to encourage the breeding of better quality in poultry. This provides recognition not only for high egg production but also for high-quality hatching eggs, baby chicks, and breeding stock. Registration in this work takes into consideration both the ancestry of the individual and the quality of the offspring. (Figs. 20 and 21.) It gives the purchaser reasonable assurance that the quality of stock purchased conforms to the breeder's description. It includes records made of home flocks under supervision as well as records at

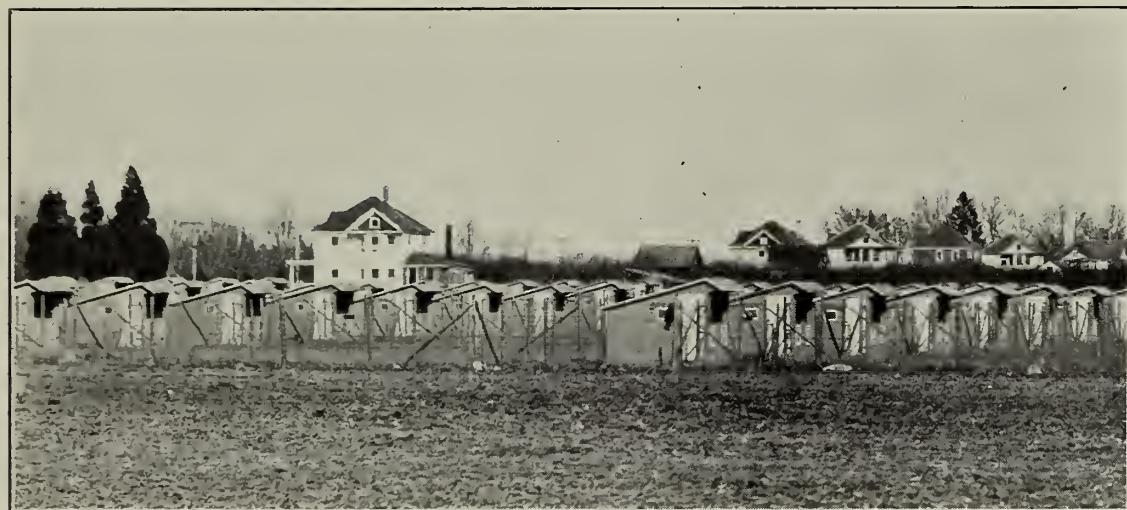


FIGURE 19.—View of houses used in one of the State egg-laying contests, which have helped to stimulate interest in breeding for higher egg production

the egg-laying contests. Breed type and standard quality are considered as well as records of production. An effort is being made to have this work, which is under State supervision, conducted uniformly throughout the United States.

Proper selection of the breeding stock is the keynote in any improvement plan. Increased production is obtained by breeding for constitutional vigor, earliness of maturity, intensity of production, non-broodiness, and persistent production. Trap nesting (fig. 22) is practiced on breeding farms, but is not generally used for farm flocks or practiced on poultry farms where market eggs are the main product.

Other important factors considered in selection are size of eggs, hatchability, and the possible inheritance of resistance to disease. Eggs are weighed at most of the egg-laying contests and size as well as number of eggs is considered in the final records. The materially lower price paid for small eggs on the market makes egg size a very

important consideration. Hatchability is known to be inherited so that selection for this character is very important in breeding. Disease resistance is of importance although but little attention



FIGURE 20.—Method of numbering eggs for pedigree trays. The wire baskets are used in the incubators to keep chicks separate

has been given to breeding for this character and the greatest improvement in overcoming disease has been along sanitation lines.

#### MANAGEMENT



FIGURE 21.—Small metal bands are placed on the wings of chicks as a means of identification. Colored leg bands are also used to indicate the time the pullet began to lay, time of molt, good egg production, and other characteristics

flocks and of hatcheries, and the use of artificial lights and heat in poultry houses.

Culling the laying flocks during the summer and early fall is a popular phase of extension work which has been carried on in practically every poultry-raising section of the United States. Changes in certain body characteristics, such as the color of comb and legs and

Many new and improved methods of management are being put into general practice through education and other means of diffusing poultry knowledge. Important phases of management are: The culling of laying flocks, indoor poultry raising, battery brooding, growth-healthy-chick campaigns, the accreditation of breeding

the space between pelvic bones, have been closely correlated with egg production. The practice of culling the poor producers has had a great influence on the management of flocks and has led to better breeding and improved methods of management.

The raising of large numbers of chickens confined or indoors has made great growth in recent years. Thirty years ago a flock of 1,000 hens was considered very large, but many farms now keep from 5,000 to 10,000 hens. While the single-story, long, poultry building is the type of house generally used, poultry houses with several stories are increasing in number. The hens are kept confined throughout the year in these big houses and the necessary vitamins are supplied by the use of cod-liver oil and green feeds. Wire floors are in use for outside sun porches (fig. 23) where the fowls get direct sunlight but



FIGURE 22.—Interior of laying house, showing trap nests and other equipment

are not allowed contact with the ground. On some farms wire floors are used in brooder and laying houses. Most commercial poultry farmers keep their hens confined to the house from early fall until spring and many poultrymen keep the laying hens confined throughout the year.

Battery brooders with wire floors in which chicks are brooded indoors in coops four or five tiers high, are now used to some extent. (Fig. 24.) They were first used for holding surplus chicks at hatcheries but were later found to be practical for broiler production and now are used to a considerable extent in the brooding of chicks raised for egg production. After the broiler stage, battery chicks are usually put out on range in coops or in colony brooder houses. Artificial methods of hatching and rearing chicks are gradually replacing natural methods.

Increased poultry production and the large numbers raised in limited areas have required more exact knowledge of poultry diseases and their control. Great progress has been made in sanitation and

in keeping poultry free from diseases. "Grow-healthy-chick" movements have been sponsored in many States and definite rules for raising healthy chicks have been formulated. These rules are along the following general lines: Clean chicks, clean incubators and eggs, clean brooder houses, clean ground, clean litter, clean feed



FIGURE 23.—Outside "sun parlors" attached to a brooder house at the Government poultry farm

in hoppers, clean management, and clean laying houses. It has been possible to measure definite improvements from the adoption of one or more of these rules by many poultry raisers.

The extensive business of hatching and selling chicks has led to the accreditation of breeding flocks and of hatcheries. The object of accreditation is to insure the production of stock of the highest possible quality. (Fig. 25.) A system of official inspection of flocks and hatcheries has been built up to protect the poultry industry. The accredited flocks must contain only purebred birds which have been approved by the State inspectors. Each bird must conform in a reasonable degree to the standard for the breed and variety asset forth in the American Standard of Perfection. The birds must be healthy and vigorous and the flocks culled for egg production. In some States a more rigid selection is made of many of the flocks; they are blood tested for certain diseases as well as being selected for appearance and condition. Hatcheries, to be

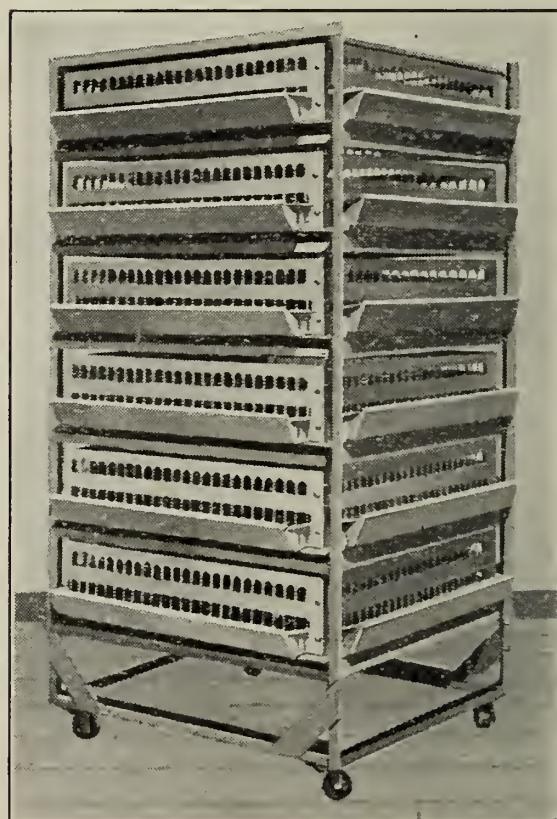


FIGURE 24.—A type of battery brooder used by hatchery men and breeders for raising chicks indoors

accredited, are not permitted to use any eggs except those from inspected flocks and must operate under certain sanitary rules. The accreditation is usually self-supporting from fees paid by the owners of the flocks and of the hatcheries.

Artificial lighting of poultry houses to increase production of eggs from pullets during the fall and winter has become a common practice on most commercial poultry farms. The lights are generally used from about October 15 to March 15 for a sufficient length of time to give the hens a 12 or 13 hour working day. Lights are also used to some extent for breeding flocks and yearling hens to get the hens back to laying after they have molted. The heating of poultry houses is a newer practice which is increasing. Only a moderate amount of heat is supplied, the chief purpose being to



FIGURE 25.—Thorough cleaning and disinfection of the laying house are aids in raising healthy hens and are required for accredited flocks and hatcheries

keep the houses and litter dry; the heat is not conserved at the expense of ventilation. The intensive method of keeping poultry in large houses lends itself to this use of artificial lights and heat.

### Turkeys

According to census figures, the number of turkeys in the United States declined rapidly from 1900 to 1910, while from 1910 to 1920 there was but little change in the industry. In 1920 there were 3,627,028 breeding turkeys on farms. Since 1920 turkey production has apparently increased somewhat, and the 1929 crop was estimated at 9 per cent greater than the 1928 crop. In recent years there has been much interest in turkey raising in all parts of the

United States. Turkeys constitute only about 1½ per cent of the total poultry population. The Bronze variety is more popular than all other varieties of turkeys combined. The White Holland is kept only about half as extensively as the Bronze, followed in numbers by the Bourbon Red, Narragansett, and others. Wild turkeys (fig. 26) still exist but are not considered a part of the turkey industry of the country.

The renewed interest in turkey production is largely a result of the relatively high prices for turkey products since about 1920



FIGURE 26.—A wild turkey, male. Turkeys originated in North America and a few are still found wild in some regions

raised on farms, especially in the northwestern part of the country.

and to increased knowledge of the control of diseases of turkeys by sanitation. The use of artificial methods of rearing turkeys and the keeping of turkeys away from chickens have greatly reduced the element of mortality in turkey raising. Only a few years ago practically all of the turkeys in this country were raised in very small flocks (fig. 27) on general farms, and it was believed that turkeys could not be raised in large flocks on limited range. Now many flocks of 1,000 or more turkeys are

### Geese

Geese make up less than 1 per cent of the total poultry in the United States and their products are not consumed so generally as they are in many of the European countries. They are raised entirely in small flocks on general farms in all parts of the country, but are most abundant in the Central and Southern States. There is some interest in fattening, and a large number of geese are collected on a few farms for this purpose. The Toulouse and Embden breeds (fig. 28) are the most popular.

### Ducks

Ducks, like geese, make up less than 1 per cent of the total number of poultry in the United States and are not kept so generally as in

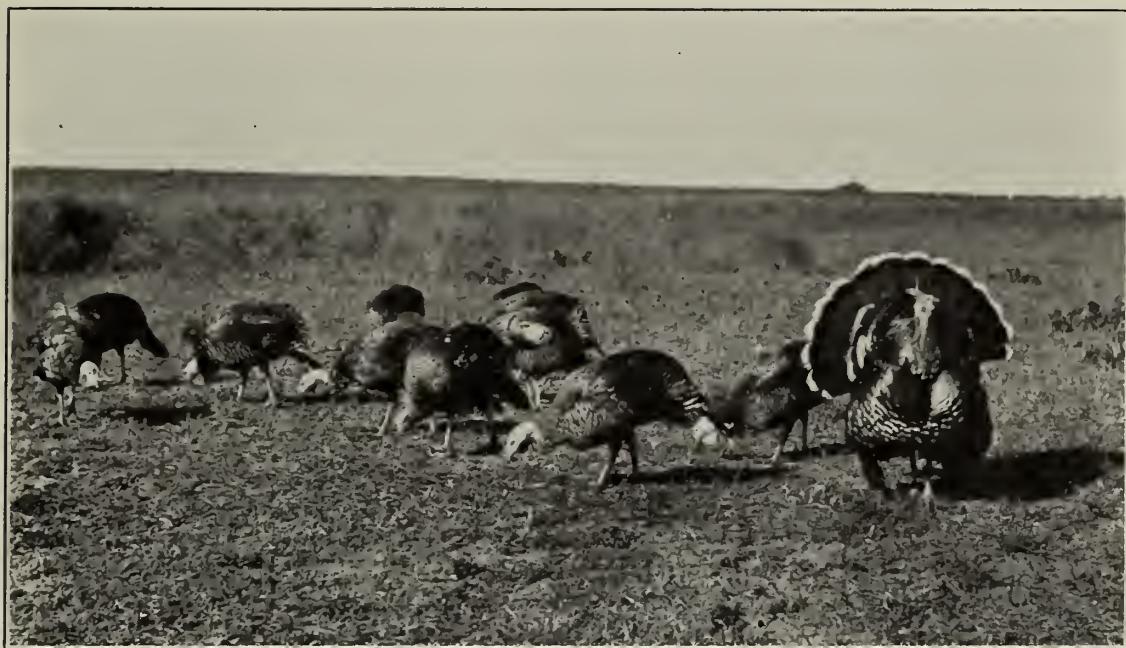


FIGURE 27.—A small flock of turkeys on pasture



FIGURE 28.—A flock of Embden geese

many parts of Europe. According to the census of 1920 the United States had 2,817,624 ducks, which was about the same number shown by the 1910 census.

Ducks are kept in small flocks on many general farms throughout the country, especially in the Central States, and are also raised in large flocks on commercial duck farms. (Fig. 29.) Probably 80 per cent of the commercial duck farms are located on Long Island in New York State, where several individual duck farms market from 50,000 to 100,000 head of ducks each year. On these large farms ducks are forced for rapid growth and are marketed at 10 weeks of age, when they weigh about  $5\frac{1}{2}$  pounds each. Ducks raised on general farms are hatched in the spring and marketed in the fall and early winter but weigh but little more than the 10-week old specially forced ducks and are not nearly so tender.

Commercial duck farming apparently increased during the period 1910 to 1920, but some decrease occurred in the number of ducks on general farms. Most of the duck farms are located where there are



FIGURE 29.—A commercial duck farm

natural bodies of water, which materially helps in their operation. It is possible to operate a duck farm without such water and there are a few dry-land duck farms in the United States. There is some tendency toward increased demand for ducks from specialized farms and some interest in building up such farms and thus increasing the market for ducks.

The Pekin is the only breed kept on large duck farms for the production of meat and it is also the most popular breed on general farms. There is little interest in keeping ducks for egg production in this country and only a limited demand for duck eggs, except at Easter time, when duck eggs bring several cents a dozen more than hens' eggs. The Indian Runner duck is bred, to a very limited extent, for egg production and the Khaki-Campbell duck has recently been introduced for this same use.

### Guinea Fowls

Guinea fowl make up only a little over one-half of 1 per cent of the total poultry population of the country. The use of guinea fowl as a substitute for game birds is slowly increasing. Young guinea fowls are served at banquets and club dinners as a special delicacy. The flesh of these young guineas is darker than chicken but is tender and of a specially fine flavor resembling somewhat that of wild game. Guinea fowls are raised entirely in small flocks as a side issue on general farming. The Pearl guinea (fig. 30) is the variety commonly kept, but very little attention has been given to the selection and improved breeding of guinea fowl.

### Game Poultry

The game-bird market has undergone a complete change in the last 50 years. Formerly this market was as well supplied, both in quantity and variety, as any in the world, the game consisting entirely of wild birds. Almost completely eliminated for a period of years through legal restrictions, it is now gradually growing. The birds now marketed, however, except for certain imported species, are for the most part propagated in captivity. With the increase in population in the United States and with progressive settlement, areas naturally productive of game birds have been greatly restricted.

Federal and State laws have provisions designed to permit and encourage artificial propagation of game birds and their marketing. Marked progress has been made in successful game farming in the United States in recent years and this industry is steadily growing. The propagation and sale of migratory waterfowl, such as wild ducks, geese, and swans, is under the regulation of the Federal Government, while the propagation of pheasants, quail, and other nonmigratory game birds is under State control. State game departments rear and distribute many pheasants and many birds are raised for propagating and stock purposes. Under present conditions the market for arti-

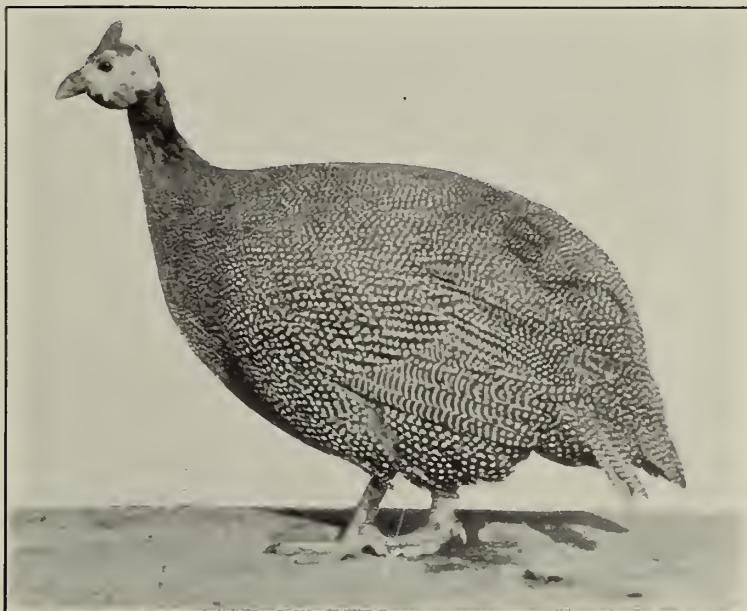


FIGURE 30.—The Pearl guinea fowl. This variety is raised more extensively than any other in the United States

ficially propagated game birds consists mainly in supplying others who desire to engage in rearing these birds. Sportsmen also use such birds for decoys and for restocking shooting coverts.

### Pigeons

Pigeons are kept in all parts of the United States but most of the large squab-producing plants are located near the large cities in the Northeastern and North Central States and on the Pacific coast. Birds selected for prolificacy are kept confined in pens on these plants so that very little land is used for squab production. Squabs are often served in place of dressed game. There is only a limited demand for squabs and this demand is mainly confined to the large cities.



FIGURE 31.—The flying and racing of homing pigeons from small lofts is a hobby in many towns and small cities

The White King, Red Carneau, Swiss Mondaine, and Homer are the most popular varieties for squab production. Large squabs are usually preferred. The Homer produces a rather small squab but is a very prolific breeder. Good production is necessary to make squab raising profitable, and breeders producing at least six or seven pairs of squabs yearly should be selected.

There is considerable interest in the raising of fancy pigeons for pleasure and for exhibition, and such pigeons often make up from one-fourth to one-third of the total entries at many of the largest poultry and pigeon shows. These pigeons, which include many beautiful and odd types, are selected entirely for color and fancy characters and are not raised for food purposes. The Homers are also bred extensively for flying and racing purposes. (Fig. 31).

Races are held every spring and fall in various parts of the country under the auspices of several pigeon associations, whose activities are nation-wide.

### POULTRY DISEASES

Poultry are susceptible to many diseases, some of which are highly infectious and cause a high mortality. Others are of minor importance. Although there is no satisfactory way to determine the loss caused each year by poultry diseases, it is well known that the losses from death, impaired vitality, decreased egg production, and the lowered fertility of hatching eggs are a serious handicap to the industry.

Since many of the infectious diseases are considered incurable in the light of present knowledge, it is necessary that effective measures of prevention and control be used.

One of the most important infectious chicken diseases is that known as bacillary white diarrhea of young chicks. This results primarily from ovarian infection with pullorum disease of the hens that produced the hatching eggs. The disease in young chicks can be greatly reduced, if not entirely eradicated, if flocks intended for breeding are blood tested, and all reactors used for food purposes, or disposed of in some way to prevent their eggs from being hatched.

Another disease which causes serious losses to the poultry industry is avian tuberculosis. Common symptoms of the disease are gradual loss of weight, wasting of the muscles, especially noticeable in the breast, paleness of the comb, and, in advanced stages, dullness, lameness, and diarrhea. The disease develops slowly and old birds generally show the most pronounced symptoms. On premises where the disease occurs, the most thorough method of eradication is to slaughter the entire flock. Fowls that are in good flesh, showing no lesions or very slight ones, may be used for food. The buildings, yards, and feeding equipment should be cleaned and disinfected. When the breeding value of the birds or other cause makes it undesirable to dispose of the entire flock, tuberculosis may be controlled to a great extent by culling all visibly affected fowls and disposing of all hens at the end of their second laying year. Avian tuberculosis is not only responsible for losses in poultry, but is also responsible for considerable loss to swine owners, since hogs are susceptible to the avian type of tuberculosis.

Other troublesome infectious diseases are roup, chicken pox, fowl cholera and choleralike diseases, and fowl typhoid. The first symptoms of roup are similar to those of an ordinary cold, whereas the later developments resemble diphtheria. Clean, dry houses are an aid in preventing roup, but mild cases may be treated by washing the affected membranes of the nostrils and mouth with a mild antiseptic solution such as boric acid or permanganate of potash. Outbreaks of

chicken pox may often be checked by destroying the birds that first show symptoms of the disease and disinfecting the laying house. Treatment of sick birds is sometimes practiced after they have been isolated from the main flock. Chicken-pox vaccines have in some cases helped to prevent the outbreak or lessen its severity.

Fowl cholera and fowl typhoid are diseases for which treatment is futile and the aim of all poultrymen should be to prevent so far as possible the spread of the infection. The first birds showing symptoms of the disease should be killed and destroyed by burning or deep burial.

The control of parasitic diseases among poultry has received increased attention in the United States during recent years. The old saying "An ounce of prevention is worth a pound of cure" applies especially to parasitic infestations of young chicks. Cures are impracticable for many diseases of this kind.

Invasions of internal parasites are especially injurious to the chick's health during the early stage of the development of the parasites and frequently it is impossible to make a diagnosis of the cause of sickness or unthriftiness at this stage. In the case of such worm parasites as the large roundworm and others that infest the intestines, it is the period of invasion of the walls of the digestive tract by the young stages of the parasite that produces the greatest amount of damage. The roundworms at this time are too small to be seen except with the aid of a high-power microscope.

Another parasite which is highly injurious to young chicks is the gapeworm, infestations of which occur only in the first few months of a chick's life. The large roundworm of the intestines also produces its greatest damage in chicks less than 3 months of age. The common cecum worm, the rare cecum worm, and the tetramere of the stomach have all been shown experimentally to produce severe symptoms of disease in young chicks while there was a total lack of symptoms, or at most only mild indications, when the parasite was introduced in older fowls. The importance of affording special protection to small chicks is therefore recognized. If young chicks can be kept free from parasites during the most susceptible period, later infestations will show little or no visible effect on their health.

In recent years there have been notable additions to knowledge of parasites and the poultry industry of the United States. For instance, coccidiosis has been shown in this country to occur not as a single well-defined form of disease, but in at least three possible forms, each form affecting a different part of the intestines and being caused by different species of coccidia. Control measures have been established along two general lines, namely, strict sanitation to prevent infection and a highly nutritious diet to help build up the resistance of the fowls.

As regards the disease known as blackhead, present-day methods of raising turkeys are based on knowledge of the manner in which this disease spreads. The chicken is known to be an important carrier of blackhead organisms, and, therefore, on the up-to-date turkey farm, turkeys are raised entirely separate from chickens.

Measures to prevent poultry from becoming infested with the worm parasites which have intermediate hosts are now possible to a much greater extent than formerly, because of discoveries in recent years concerning the identity of those intermediate hosts. In the case of tapeworms, for instance, dung beetles, ground beetles, house flies, snails, slugs, earthworms, and probably grasshoppers may serve as intermediate hosts. Hence, if control measures are directed against those hosts, the danger of the parasite to poultry is greatly reduced.

It has been shown that gapes can usually be controlled by raising young chickens entirely separate from turkeys or away from areas ranged by turkeys, since the turkey is the most important carrier of the gapeworm. Earthworms have also been found to be important in the spread of gapeworms, not as a necessary intermediate host but as a mechanical carrier. Control measures based on this fact, in areas in which gapeworms are likely to occur, include such procedure as raising chicks on high, dry, sandy soil unfavorable to earthworms, or keeping the chicks confined in the morning until the dew has dried off, or after rain storms until the ground has dried, so that the majority of earthworms will have disappeared.

Land used for poultry should receive regular cultivation or be planted to grass, clover, or some other crop. Some poultrymen also lime their soil annually in order to destroy parasites and their eggs. Any means of drying the soil is also of value in destroying parasites and their eggs.

It is important likewise to keep poultry houses clean at all times and well littered with clean, dry straw. Thorough disinfection of the poultry house, including roosts and roosting quarters, every few months will help greatly in keeping fowls free from mites.

When the birds are found to have lice it is advisable to treat them occasionally with commercial sodium fluoride, using a small pinch which is rubbed into the feathers in various parts of the body.

Other measures to prevent parasites, in general, include rotation of yards, the use for feed and water of containers which can not be contaminated by the droppings of the fowls, and frequent removal of droppings and their disposal in such a manner that worm eggs or other disease-producing organisms which may be present will be isolated not only from the fowls but also from possible intermediate hosts. Raising domestic birds, chiefly chickens and pigeons, on raised wire-mesh floors, through which the droppings will fall, is being resorted to in some instances.

Sanitation, hygiene, breeding for the purpose of developing vigorous birds, management, and proper construction of buildings, all play an important part in the successful raising of poultry. In fact, the great increase in extent and importance of the poultry industry in the United States has resulted largely from the general adoption of better methods of management and the control of diseases.

### Veterinary Supervision of Imports and Exports

As a means of preventing the possible spread of poultry diseases in commerce from other countries, imports of poultry from all countries except Canada are subject to inspection at ports of entry. The regulations of the Federal Bureau of Animal Industry require that, in the case of dressed poultry from countries in which foot-and-mouth disease exists, the feet be removed above the spur or spur core. This requirement is designed to prevent the possible introduction of foot-and-mouth disease, especially since the feet of poultry often form part of the garbage used for feeding swine.

The need for veterinary inspection of imported poultry has become further apparent by outbreaks in recent years of European fowl pest. Both of these outbreaks, fortunately, were eradicated by the prompt destruction of all infected and exposed birds and the disinfection of premises involved.

The veterinary supervision of poultry exports is conducted under an act of Congress, recently amended to grant the Bureau of Animal Industry authority to inspect live poultry for export to foreign countries.

### MARKETING POULTRY PRODUCTS

Because of the widespread nature of the poultry industry in the United States, with its attendant long distances between the areas of greatest surplus production and the areas of deficient production, the marketing of poultry products has developed into a highly specialized business of great commercial magnitude. During the year 1929, for example, there was required to supply the cities of New York, Chicago, Philadelphia, Boston, and San Francisco alone, a total of more than 15,500,000 cases, each holding 30 dozen eggs. In the same year, shipments to these cities of dressed poultry amounted to over 380,000,000 pounds. New York City, the largest market in the United States, has an average daily requirement of more than 600,000 dozen eggs (fig. 32), about 500,000 pounds of dressed poultry, and over 30 carloads of live poultry.

The transference of these products from points of production to the consumers necessitates the gathering of the products from the farms where they are produced, their concentration at central shipping points, a system of grading and packing and extensive transportation

before they reach the hands of distributors in the principal markets, and from them go to the jobbers and to the retailers. Each step in the marketing process requires labor, skill, and specialized knowledge, and in addition the money investment is heavy and the risk considerable. The perishable nature of the poultry products necessitates as great a saving of time in handling as possible in order to prevent waste and loss. For these reasons, the various marketing functions have been divided to a large extent, and different ones are performed by different groups, specialization having naturally taken place to a marked degree.

The production of the egg and poultry crop is highly seasonal. Spring is the natural season of reproduction for all poultry, and the

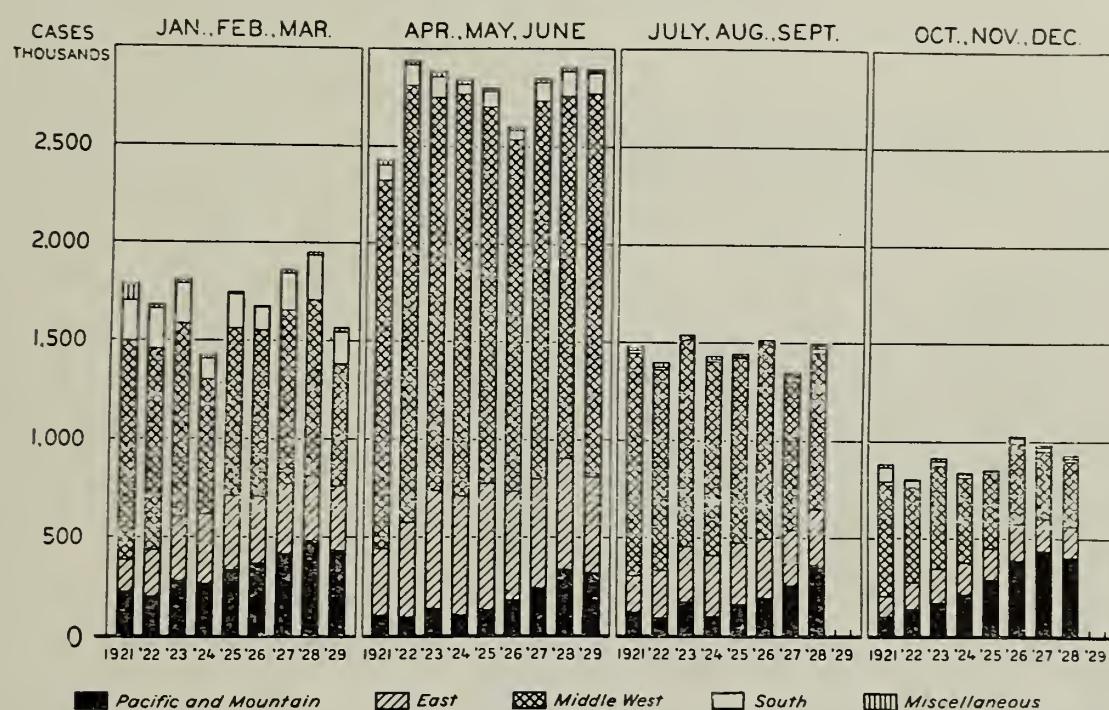


FIGURE 32.—Seasonal receipts of eggs at New York City by regions of origin, 1921-1929. The Middle West is the source of most of the eggs received at New York City

spring and early summer are the seasons of greatest egg production. The great bulk of the chicken crop becomes available for market during the fall and winter seasons. It has been necessary, therefore, to develop a marketing system which would take care of this seasonal production, but this necessity adds complexity to the problem of successful marketing.

The problem of deterioration and spoilage is important in the United States, since poultry and eggs are both perishable products and since they have to move long distances to market. This means that they must be marketed promptly and handled under conditions which best preserve their quality; otherwise deterioration will be rapid and spoilage will be serious. The methods of handling, processing, grading, and transporting have been developed to prevent this deterioration and spoilage so far as possible.

The quality of poultry products as they enter the channels of trade may show a wide variation. This is due in part to natural differences in the original product. It may also be due in part to the deterioration which may occur after production and may be caused either by faulty handling or delay in marketing. It is therefore usual to examine these products critically at one or more points during their journey to market that they may be sorted or graded according to their quality and be placed in consumptive channels best suited to them, and that the best possible prices may be realized for them. Sorting or grading, therefore, becomes a necessary and important process in the system of marketing.

### Methods of Marketing Eggs

Eggs may reach their final market through a multitude of channels.

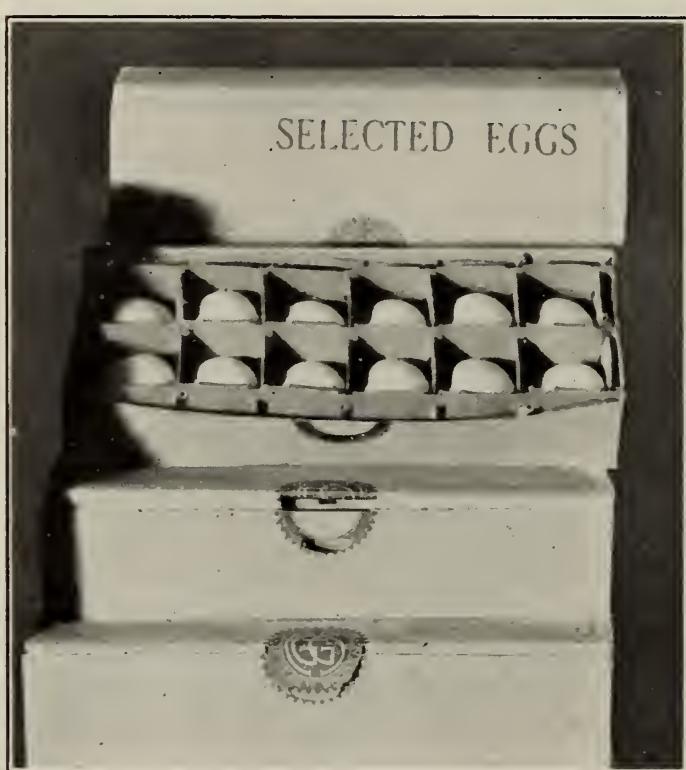


FIGURE 33.—The common retail package for eggs is the carton holding a dozen

There are so many combinations of circumstances involved in marketing eggs that no attempt can be made to describe all of them in detail. Broadly, the marketing of eggs in the United States may be divided into two groups—those which are shipped by the producer direct to the terminal markets, and those in which the eggs are concentrated, after they leave the hands of the producer, combined with other similar lots of eggs, and shipped to market in large lots. The shipment to market direct by producers involves a

much smaller volume of eggs than does the system whereby the eggs are concentrated and marketed through intermediate hands. Some of the more common types of direct shipment are shipment or sale by producers to retailers, hotels, restaurants, etc., and shipment by producer to city jobber or wholesale receiver.

### DIRECT SHIPMENTS BY PRODUCERS TO CONSUMERS

Shipment or sale of eggs by the producer direct to consumers is a method utilized primarily by those living in fairly close proximity to a large market or to a large, consuming population. If the producer is situated sufficiently near he may establish a regular city delivery route which he serves regularly on certain days of the week. The

number of producers so situated that they can take advantage of such a method is limited, but has increased in the last few years. Time and effort are required both in establishing such an outlet and in serving it regularly, but better prices are usually obtained.

In some instances the producer may take his eggs to the city on certain days of the week and dispose of them at the public market. The usual retail package for eggs consists of the dozen carton—a convenient pasteboard box with fillers forming individual cells for the eggs. These cells are arranged two wide and six long. (Fig. 33.)

Parcel post is another channel for direct trade between producer and consumer. As postal charges increase with the distance the goods are shipped, most parcel-post deliveries (fig. 34) are limited to points within a relatively narrow zone. Arrangement is usually made with the consumer to make shipments of stated amounts of eggs at prearranged intervals. Usually several dozen are sent at a time in order to reduce the shipping cost per dozen.

With the wide extension of good roads a constantly increasing quantity of eggs is being sold by producers at their own doors to motorists who drive out from the cities.

A further expansion of this direct sale by producers to motorists has taken the form of regularly established roadside markets. In the area within a radius of 10 or 15 miles of cities, this type of direct marketing is growing rapidly.

Within the area where shipment of eggs to market by express or by truck is not prohibitive in cost, a large number of producers make direct shipments to the cities. This frequently offers an advantageous market. A fairly common outlet for shipments of this kind is a retailer, a hotel, restaurant, soda fountain, or hospital—all agencies that are interested in securing a high-quality product. Producers sending their own eggs direct to the terminal market usually ship to jobbers or to wholesale receivers. This outlet is used primarily by those producers who wish to make their own shipments to market, but who are not in position to give the time and effort necessary to work up and maintain an outlet such as previously described.

#### SHIPMENTS TO CONCENTRATION POINTS

By far the greater bulk of eggs moves to market through a concentration point. The producer sells his product to some agency located close to his farm, and the various processes involved in moving

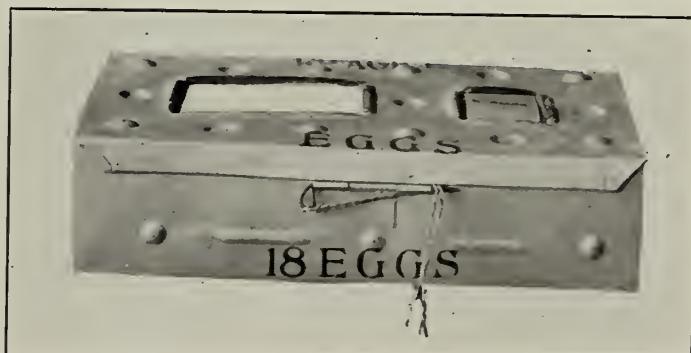


FIGURE 34.—Returnable parcel-post egg containers are constructed of light metal

the eggs from that point to market (fig. 35) are the responsibility of others. Among the agencies which act in the capacity of gatherers or concentrators are the country store, the huckster, the local buyer, the poultry and egg packing house, the creamery, and the cooperative association.

*Country stores.*—In most of the general-farming sections which are located at a considerable distance from the large, consuming markets and where the size of flocks and the volume of eggs produced per farm are relatively small, it is a long-established custom for the country stores to handle the eggs of their patrons. This practice has grown up chiefly as a convenience to the store's customers and because it served to attract trade to the store.

The eggs are paid for either in cash or in trade. The country store commonly buys the eggs on what is known as a case-count basis, that is, on the basis of a certain price per dozen without respect

to the quality of the goods or to their size, because it is the easiest way. It means that an average price is paid for all qualities, and the price of the good eggs purchased by the store is low enough to cover the loss sustained on poor eggs which are worth less than the price paid.



FIGURE 35.—Refrigerator cars are used for shipping eggs and dressed poultry by freight

This system of buying by the country store, where quality receives no recognition, has been a great factor in encouraging careless and dilatory methods of production and handling, and is responsible for a great deal of the deterioration and loss in the annual egg crop.

Practically none of these stores have refrigeration or suitable facilities for holding the eggs, which are very likely to suffer considerable deterioration before they are shipped out by the storekeeper. Shipments from country stores generally go to an egg packer or buyer located at some larger center.

*Hucksters and individual buyers.*—A traveling dealer, commonly known as a huckster, who goes from farm to farm or from store to store with an automobile truck buying up eggs, is one of the methods of collection employed. He may work independently or he may be an agent of an egg packer. At present, with the development of automobiles and hard roads, the hucksters usually bring in to the market center each night the eggs they have gathered during the day.

This has resulted in a vast improvement in the quality of the eggs gathered by hucksters. There is some tendency toward the further extension of huckster routes.

In some of the small towns in the general-farming sections, men may be located who make a specialty of buying eggs. Most of this egg business is on a cash basis, and these buyers are more likely to candle the eggs and to buy on a loss-off basis, that is to say, to throw out and refuse to buy any bad eggs. In recent years there has also been a greatly increased tendency for these buyers to operate on a quality basis, that is, to candle the eggs and grade them into two or more grades, and pay different prices for the different grades. Usually these egg buyers are not well equipped to carry the eggs without deterioration, but they usually make prompt shipments and so avoid much loss. Where the egg buyers are employed by an egg-packing house, it is common practice to run a truck through and pick up the eggs daily or every second day and carry them to the concentration point where suitable facilities for holding and handling exist:

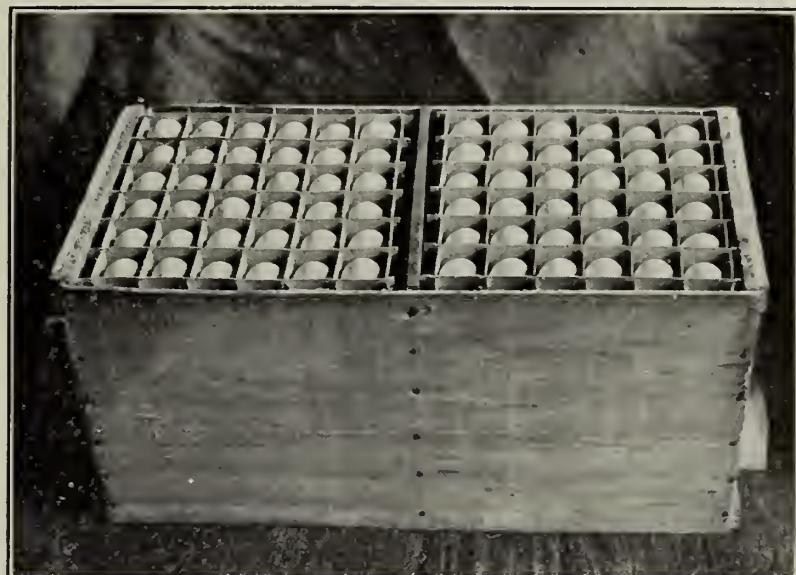


FIGURE 36.—The commercial 30-dozen egg case, when properly packed, carries the eggs to market with relatively little breakage

*Car-lot shippers.*—Most of the eggs produced in the central part of the United States are eventually handled by the car-lot poultry and egg shipper. This shipper, usually located at some strategic point with reference to roads and railroads, receives shipments by truck and by train from storekeepers, hucksters, and local buyers. He also purchases some eggs direct from producers, and in the last few years there has been a definite effort on the part of car-lot shippers to increase the amount of business secured direct from producers, because of better quality of the product. Upon receipt from these sources, the packer candles and grades the eggs and combines them into lots of similar quality. It is at this point that the eggs are commonly packed in the usual commercial package in which they make the rest of their journey to market. The standard commercial package for eggs in the United States consists of a veneer wooden case which holds 30 dozen eggs. (Fig. 36.) This case is divided into two compartments of equal size, and the eggs are packed in each of these compartments in

square fillers made of strong strawboard or wood-pulp board, each of which is divided into 36 cells or compartments. Five of these fillers are packed in each side of the case. A protective padding of flats or excelsior cushions is used at the bottom and top of the case, and various styles of dividing boards or flats are used between the fillers of eggs.

The modern egg-packing plant is equipped with chill rooms where eggs can be held under proper temperature conditions, usually 40° F. or below, which will enable the eggs to be carried with the least possible deterioration. These chill rooms are cooled by means of small, mechanical, refrigeration plants. After the eggs have been candled, graded, packed, and chilled, they are packed in a car and forwarded to market. In the Central States, the usual carload of eggs consists of 400 cases. In shipments made from the Pacific Coast States to eastern markets, it is common to pack as many as 500 or 600 cases to the car. The eggs are loaded into refrigerator cars and during a large part of the year ice is placed in the bunkers of the refrigerator cars to keep the eggs cool during shipment to market. These shipments go direct to the larger cities where they are sold to wholesale dealers or handled by wholesale dealers on a commission basis. During the spring months when egg receipts are at their maximum many of these cars may go direct to the cold-storage warehouses.

*Country creameries.*—In a few instances, country creameries make a business of receiving and handling the eggs of their patrons. This is particularly true of cooperative creameries. Usually the creamery has chill-room facilities to utilize for proper holding of the eggs. If the patrons of the creamery deliver their milk, it is easy for them to deliver their eggs at the same time, and the eggs are usually in a fresh condition, since they must deliver their milk or cream at regular and frequent intervals. If the creamery operates collection routes the matter is simple. Dealers in butter at the terminal markets are often also dealers in eggs. In spite of the apparently logical function of the country creamery as a collection and marketing agency for eggs, much less activity of this kind has taken place than might be expected.

*Cooperative shipments.*—The cooperative association in some sections is an important agency in the collection and marketing of eggs, especially in sections where egg production is highly developed and where the individual producers are acutely interested in the marketing of eggs as one of their principal products. In some localities the producers have banded themselves together into cooperative associations which function for the benefit of their members. In most instances these associations function primarily in the concentration, grading, and shipment of the eggs, leaving the distribution and selling

in the terminal markets in the hands of private agencies already established there. The larger cooperatives may function not only on the shipping end but also as terminal market wholesale distributors. To a lesser extent the associations may function as jobbers in the terminal market.

#### Methods of Marketing Poultry

The great bulk of the poultry crop of the United States is sold alive by the producer. This is due partly to the fact that producers as a class are not skilled in the operation of killing and dressing poultry, and also because they do not have the proper facilities for dressing and for shipping in a dressed condition. In some sections of the country, especially close to the terminal markets, some poultry may be dressed by producers and shipped direct to market. A considerable quantity of turkeys for the Thanksgiving and Christmas markets is dressed by producers and sold in that condition. This is true even in remote sections where the dressed birds are pooled and shipped to market. The risks of dressing by producers are less at that time because of seasonal weather conditions.



FIGURE 37.—Live poultry is commonly shipped short distances by express in coops

The outlet chosen by the poultry producer for his product is influenced largely by his location. If he is close to the city and sells his poultry alive, he usually coops it and ships it by express to a poultry dealer in the city. (Fig. 37.) If he is remote from a large terminal market, it is more common for him to take his poultry in to the nearest village or small city and sell it there to a local buyer or to a car-lot packer and shipper if one is located there. The car-lot shipper of poultry concentrates these smaller lots from individual producers or from poultry buyers and hucksters and may either ship them alive to market or may dress them and ship them dressed.

## SHIPMENTS OF LIVE POULTRY

A considerable part of the demand for live poultry in the terminal markets arises from the Jewish population, which requires that the poultry used by it be slaughtered in accordance with the rites of the Hebrew religion. There is, therefore, a fairly steady demand for live poultry throughout the year, but this is increased decidedly in the spring and in the fall at the time of the Jewish holidays.

Shipments of live poultry by the producer either to the terminal market or to the country concentration point may be made by express, by freight, by automobile truck, or by the producer's own automobile. The poultry is placed in coops constructed of wooden slats or rods or covered with wire netting. Shipments from concentration



FIGURE 38.—Specially constructed cars are used for the shipment of large quantities of live poultry by freight

points by freight to the terminal markets are generally made in especially constructed live-poultry cars. (Fig. 38.) These cars consist of a series of coops or compartments built one above another along each side of the car. There are 128 such compartments, 64 on each side of the car. The outside of the car is covered with wire netting to provide good ventilation. A square space in the center of the car constitutes a room which the man accompanying the shipment occupies and where the supply of feed and water is carried. Each of the coops or compartments has troughs to be filled from the aisle extending through the center of the car and from which the coops can be cleaned. A car of this kind has a capacity of about 4,500 chickens, from 2,000 to 2,400 geese, or from 1,200 to 1,500 turkeys. Birds shipped in such a car may be from 2 or 3 days to 6 or 7 days en route.

In the hands of a skillful caretaker, healthy birds show few deaths, and the weight of the carload may in some instances actually increase en route.

#### MARKETING DRESSED POULTRY

While most poultry is marketed alive by producers, the bulk of it eventually reaches the terminal market in dressed form. When dressed by producers the poultry must be shipped packed in ice. A common method of packing is to place it in barrels, packing alternate layers of poultry and ice. Before packing, the poultry should be thoroughly cooled to remove the body heat. The great bulk of dressed poultry, however, comes from the more remote areas where it is



FIGURE 39.—Feeding or fattening stations of large capacity are common units of modern poultry-packing establishments

out of the question for individual producers to attempt to make shipments.

This poultry is received at poultry-packing houses, most of which operate a feeding station in connection with them. (Fig. 39.) The poultry is separated or sorted according to class and is placed in tiers of coops on wheels, known as batteries. As soon as a battery is filled, it is taken to the feeding station and kept there with other similar batteries to allow the stock to be fed. In some instances these feeding stations are very large and have a capacity of from 50,000 to 100,000 birds at one time. The birds are kept in these batteries and fed on a ration consisting largely of corn meal and milk for a period ranging from 3 or 4 up to as high as 10 or 14 days. The purpose of the feeding is both to increase the weight of

the poultry and to improve its quality. If the increase in weight is sufficient to pay for the cost of feed and labor, the improvement in quality should bring a profit to the feeder by virtue of a better price.

The bulk of the poultry is received at the poultry-packing houses (fig. 40) during the late summer, the fall, and the early winter months. The receipts during the late summer consist largely of the smaller-sized birds or broilers. A little later the birds increase in size and are known as fryers; during the later fall and early winter a large proportion of the receipts are the larger size of chickens commonly known as roasting chickens.

*Handling, grading, and packing.*—After the birds have been fed a sufficient length of time in the feeding station they are taken to the

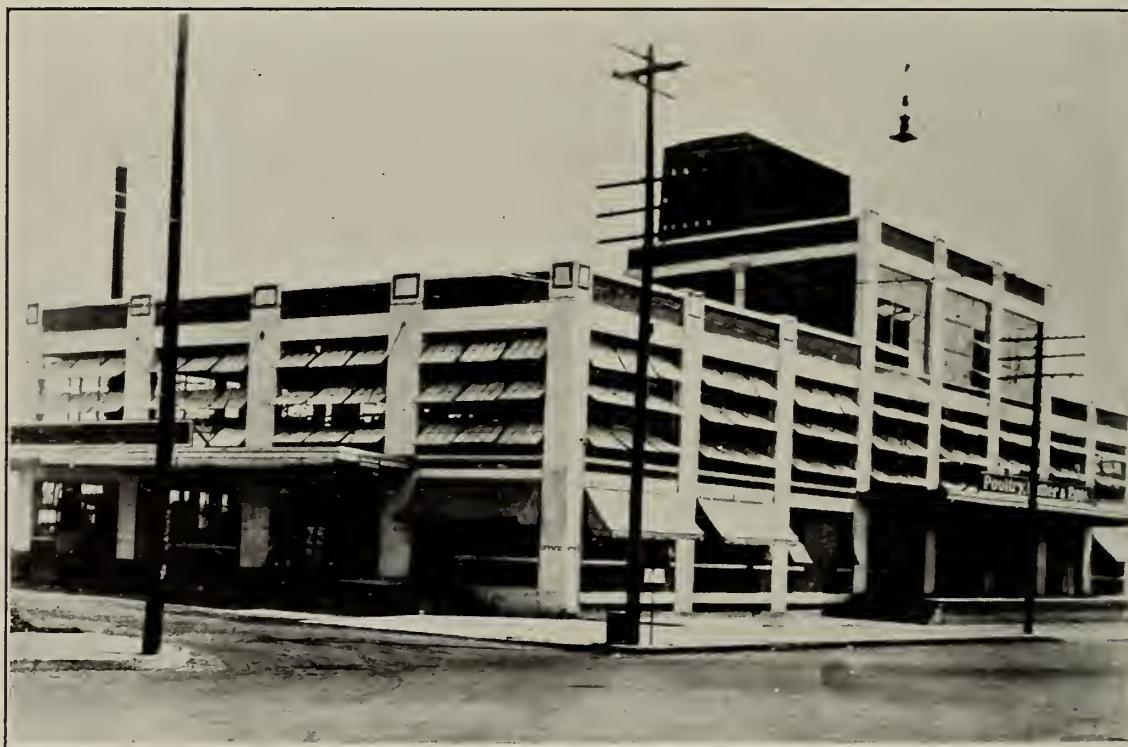


FIGURE 40.—A typical poultry-packing house where both eggs and poultry are received, graded, and shipped to market

dressing room. Here each bird is hung by the feet and bled and killed by an expert operator. Bleeding is done through the mouth by cutting the veins in the throat just back of the base of the skull. Following this, the point of the knife is run through the roof of the mouth into the brain of the bird.

Formerly most of the poultry was dry picked, the picking beginning immediately after the bird was stuck, while the feathers could be removed most easily. In the last few years a method of picking known as the semiscald or slack-scald method has almost entirely replaced the dry-picking method. In the semiscald method, as soon as the bird is bled it is run through a tank of water maintained at a temperature of from 125° to 128° F. and is thoroughly agitated so that the water will completely penetrate the feathers. After this is done the bird is turned over to a picker who removes all of the feathers.

The appearance of the semiscalded bird is much like that of the dry-picked bird except that there may be a more complete removal of pin-feathers.

After the bird is plucked it is dried and hung on a rack in such a manner that it does not touch the neighboring birds. These racks are then run into a chill room (fig. 41) where the temperature is maintained at 30° to 32° F. and left there for about 24 hours. The body heat is thus entirely removed from the carcasses, which is very important in the proper keeping of the poultry. Poultry dressed for many local markets may be hard scalded, that is, scalded by water heated nearly to the boiling point. Such scalding makes the poultry



FIGURE 41.—The slaughtered poultry is hung on racks and placed in chill rooms to remove body heat. The head of each bird is wrapped in paper

easy to pluck, but it alters the appearance of the carcass. The hot water tends to cook the skin partially and gives the bird a plumped appearance.

After the poultry has been thoroughly chilled, it is ready for grading. Grading is done on the basis of class of poultry, its quality, and its weight. Dry-picked or semiscalded poultry is commonly box packed. Each box holds 12 carcasses which may be packed in a single layer with the breasts up, or in the case of certain heavier classes of poultry, may be packed in two layers on their sides. The boxes are marked with the gross, net, and tare weights of the poultry, also with the class and usually with the grade of the poultry or with some brand

name indicating grade. Some poultry may be packed in barrels, especially some of the lower-grade stock, such as old cocks. As soon as the poultry is packed either in boxes or barrels, it is again removed to the chill room where it is kept until it is ready to be loaded for shipment. Shipment is made in refrigerator cars with the temperature at a relatively low point to keep the poultry in good condition in transit. To accomplish this, the car bunkers are generally filled with a mixture of crushed ice and about 10 per cent of salt.

Poultry packed in boxes or barrels without ice is commonly termed "dry-packed poultry," in contrast to poultry packed in ice, called "ice-packed poultry." When refrigerator-car service is not available



FIGURE 42.—Refrigerator show cases for displaying poultry for retail sale keep the birds clean and sanitary

or where the quantity of dressed poultry to be shipped is comparatively small, or where the distance to market is short, ice packing is sometimes used. Ice-packed poultry is often chilled in cold, running water or in ice water. Dry packing under most conditions is superior to ice packing, more sanitary, and generally preferred in the markets.

#### Distribution of Poultry Products

The typical agencies of distribution for poultry and eggs in the larger markets consist of wholesale dealers or receivers, jobbers, and retailers. The wholesale dealers receive their supplies of these goods from country shippers, usually in comparatively large lots, such as car lots. It is the function of the wholesaler to split up these large lots

of eggs into smaller lots and distribute them to jobbers and to large users, such as chain-store organizations. The typical jobbers purchase usually in less than car lots from wholesalers and prepare these products for retailers' use. This means that they must split their supplies into smaller lots and make delivery of the product. Usually they do some grading to meet the needs of the retailers they serve. The retailers (fig. 42) sell to the consumers either just as they are received from the jobber or after the retailer has graded the product, especially eggs, into more refined grades.

The functions of the dealers are not always clearly separated. The wholesale dealer may do some jobbing business, whereas the jobber may act as a receiver to some extent. In the smaller markets there is a tendency for the services of the wholesale dealer and the jobber to be combined. In the larger markets in recent years there has been a decrease in the amount of strictly wholesale business partly as a result of purchases by chain stores direct from country shippers. As a result there has been a noticeable tendency for wholesale dealers to develop a jobbing department in their business. Usually egg dealers operating in the terminal markets also handle butter; sometimes eggs and dressed poultry are handled by the same dealer, but poultry dealers usually operate in that line alone, especially if they handle live poultry. The receivers of car lots of live poultry in markets such as New York City (fig. 43) operate strictly as buyers or as brokers or commission merchants. They, in turn, sell the live poultry to the licensed slaughterhouses where the poultry is killed and sold to retail stores.



FIGURE 43.—Live poultry received by freight at New York City is inspected, unloaded into large coops, and loaded on trucks for transportation to poultry slaughterhouses

### Cold Storage of Poultry Products

#### STORAGE OF EGGS

The production of eggs is decidedly seasonal and supplies of this product coming to the markets for sale show wide fluctuations in volume. During the spring and early summer months production is

at its height and the quantity of eggs for market is far in excess of the consumptive demand. In contrast, during the fall and winter months the marketable surplus of eggs of current production is far below the demand for consumption. Because of this seasonal production cold storage (fig. 44) plays an important part in the marketing of eggs. Before the advent of cold storage there was no efficient means of holding over the surplus crop of eggs from the season of flush production to the season of scarcity. As a result egg prices reached a very low level during the spring and summer. In the fall and winter, on the other hand, prices were very high, relatively, and even at those prices the supply of eggs was limited.

Commercial cold storage for eggs changed this condition. At present the surplus egg crop is placed in cold storage and held there

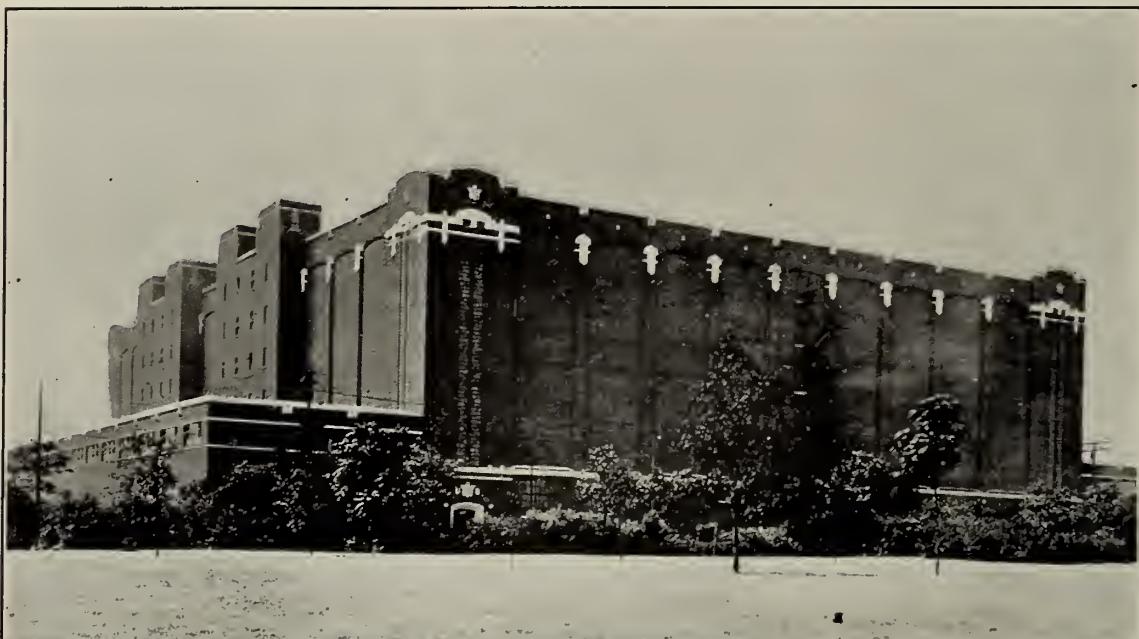


FIGURE 44.—This modern cold-storage warehouse has a capacity of more than 50,000,000 pounds of perishable products. A supply of perishable foods can be stored within its walls at one time sufficient to supply the entire population of a city as large as Chicago for a month

in a wholesome condition until the period of scarcity. The demand for eggs for storage during the spring months has tended to hold the price of eggs at that season at a higher level than would otherwise be the case. The available supply of eggs in the warehouses during the fall and winter furnishes eggs at a sufficiently moderate price so that the great majority of consumers can use eggs freely during that season. At the same time the supply of cold-storage eggs does not prevent the sale of high-quality fresh eggs at good prices.

The cold storage of eggs acts as a market stabilizer in two respects: (1) As a stabilizer of price modifying extremes in both directions, and (2) as a stabilizer of market supply, making eggs a common article of food, available to all throughout the year. Normally there are in cold storage in the United States at the peak of holdings, which occurs about August 1 each year, somewhere in the neighborhood of 10,000,000 cases

of shell eggs in addition to holdings of frozen eggs, which in recent years have amounted to 80,000,000 or 90,000,000 pounds.

Eggs normally begin to move into cold storage in the United States in a comparatively small way during the month of March. The storage of eggs proceeds at a rapidly accelerated rate during April and May. This rate slackens perceptibly during June and is usually concluded with a comparatively small movement into storage during July. The movement of eggs out of storage normally begins slowly in August, becomes more rapid in September, and reaches its most rapid rate during October, November, and December. The out-of-storage movement then gradually tapers off until the storage warehouses are practically emptied by March 1. (Fig. 45.) Eggs in the shell are never carried over from one storage season to the next.

The business of operating cold-storage warehouses is a separate business in itself; the companies seldom own any of the eggs they are holding. The eggs are placed in cold storage by shippers, by receivers, or dealers who have outlets for these eggs in connection with their regular trade, or by speculators. The warehouse companies merely rent space to the owners of these eggs and also may make cash advances on the eggs held.

There is no Federal law in the United States which requires cold-storage eggs to be sold as such. A number of the States, however, have cold-storage laws which require that such eggs must be sold as cold-storage eggs. Under these laws cold-storage eggs are generally defined as those which have been held at a temperature of 40° or less for 30 days or more, not counting refrigeration in transit.

Eggs produced in April are generally favored as cold-storage eggs. They go into storage in better condition than eggs produced later, during the warmer weather, and they naturally come out of storage in better condition at the end of the storage period. Eggs for storage are usually carefully graded with respect to size, cleanliness, and freedom from cracks or washed eggs, and for interior quality. They are packed in new, odorless cases with new packing material.

The rooms in which the eggs are stored must be sweet and clean in order that they will not impart any undesirable flavor or odor to the eggs. The temperature of these rooms is maintained as close to 30° as possible. Formerly only a moderate degree of humidity was maintained in the egg-storage rooms, but of late there has been a tendency to increase the humidity, and by so doing to increase the fullness of the eggs when they were removed from storage. To prevent the development of mold where the high humidities are used, it is necessary to keep the air in the storage rooms in circulation. (Fig. 46). Recently also some experiments have been undertaken with favorable preliminary indications in the use of carbon dioxide in the atmosphere of the storage room.

As eggs are prone to absorb foreign odors and flavors, other products should never be stored in the same room. During the last few years

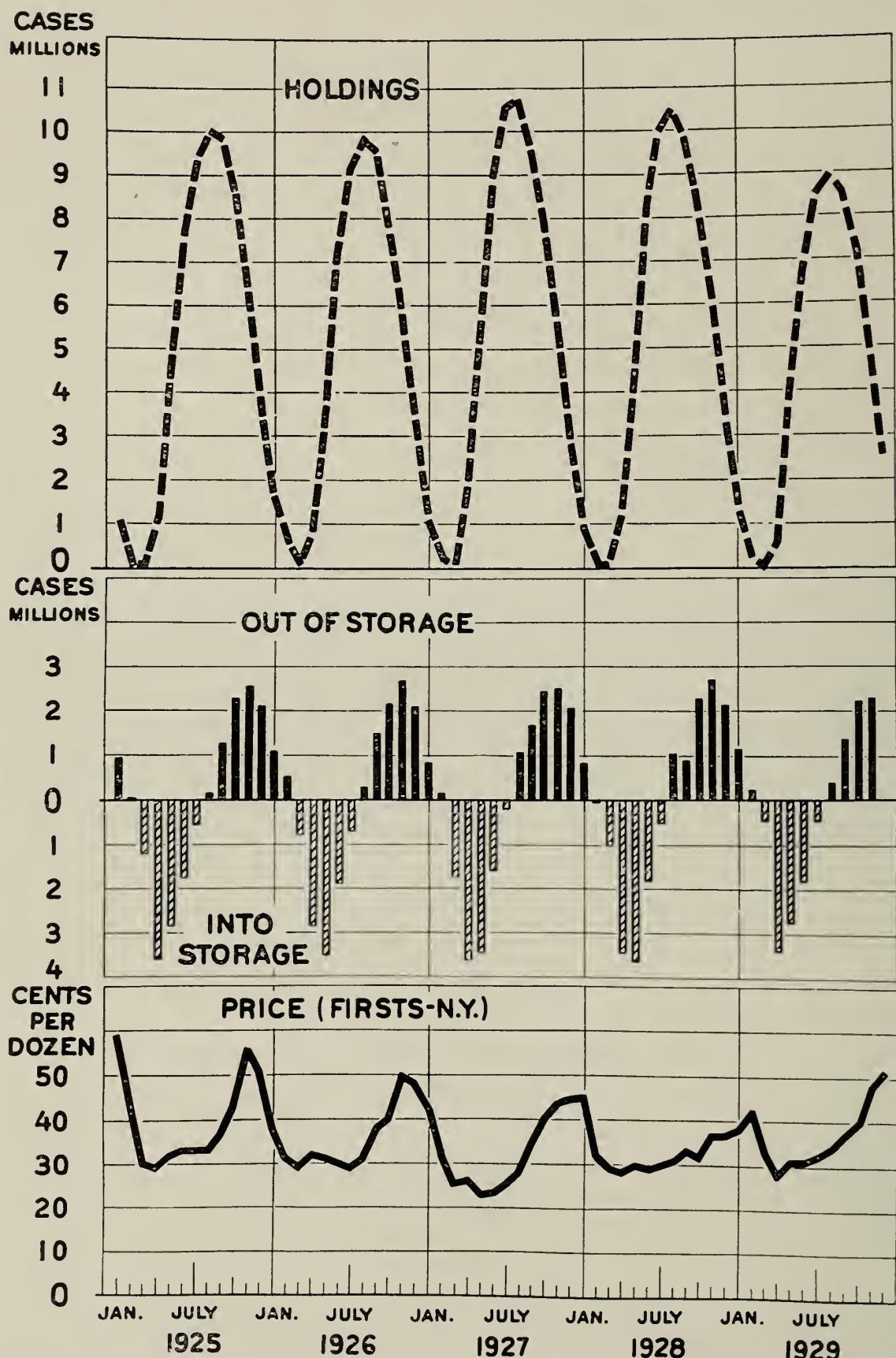


FIGURE 45.—Cold-storage holdings and New York City price of case eggs, 1925–1929. Eggs go into storage when the price is low and come out of storage when the price is high

methods of processing eggs have been devised intended to preserve better their quality when held in storage. The processing consists in dipping the eggs in an odorless, tasteless, mineral oil, to seal the pores

and thus prevent or lessen the amount of evaporation of moisture from the eggs and the absorption of flavors and odors.

#### STORAGE OF POULTRY

Poultry, like eggs, constitute a seasonal product. There is more or less movement of both live and dressed poultry to market throughout the year, but the largest supplies reach the market in the fall and early winter months. During the other parts of the year adequate supplies of chickens are not available, and it therefore becomes necessary to hold in cold storage the fresh supplies received during the fall and winter for use during the first six months of the year. The cold

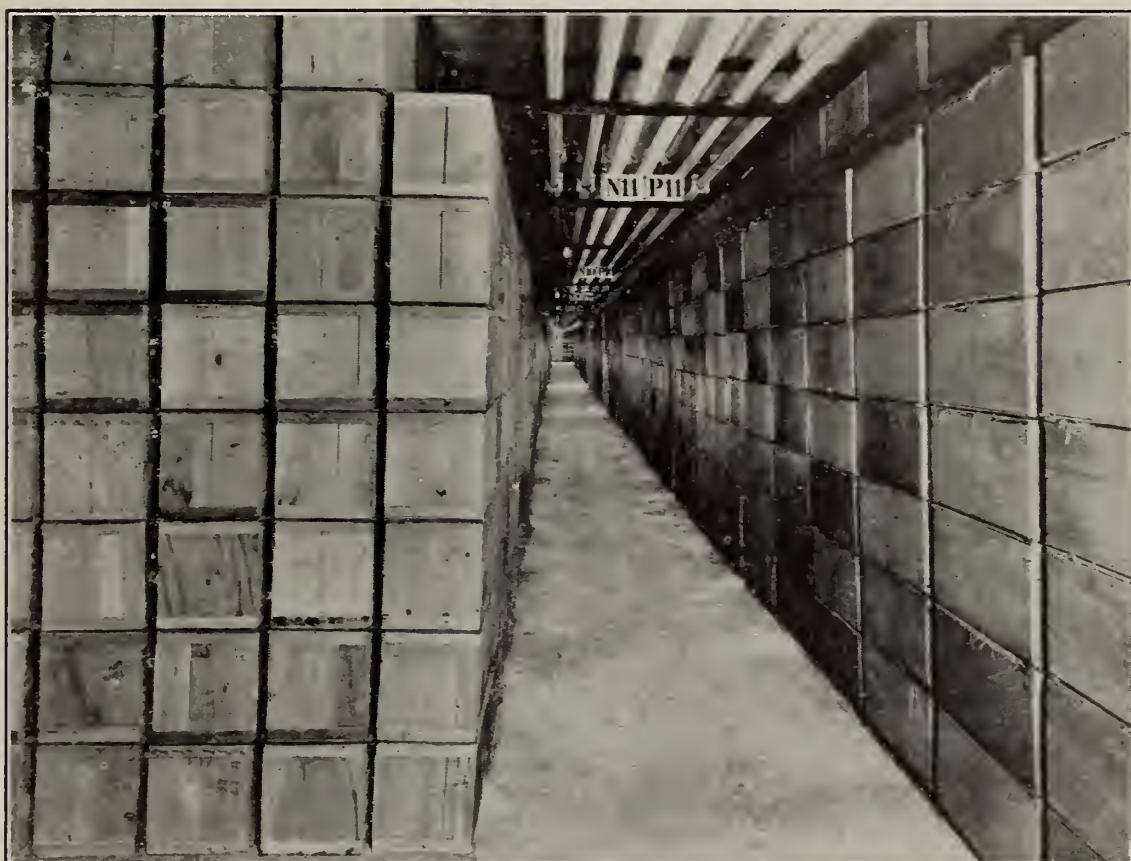


FIGURE 46.—Cases of eggs are stacked in cold-storage warehouses on racks, with slats between cases

storage of dressed poultry serves in general the same purpose as the cold storage of eggs.

Dressed poultry intended for cold storage must be graded and packed in accordance with the usual procedure in preparing poultry for market. Before it is stored, the boxes of poultry are placed in rooms known as sharp freezers, where the temperature is maintained at 0° F. or below. After the poultry is frozen hard, it is removed to a room for holding where the temperature is maintained at about 0°.

The lowest point in stocks of poultry in cold storage occurs about September 1 to October 1 each year. From this point on, holdings gradually increase until they reach their high point on January 1 or February 1, from which point they gradually decrease to their low point. Storage stocks of broilers are the first to show an increase,

followed in turn by fryers and roasting chickens. Greatest additions to storage supplies are made in the months of November and December. It is during these months that the cold-storage stocks of turkeys are largely replenished.

### Breaking and Freezing Eggs

Many of the egg and poultry packing plants operated at country points have an egg-breaking unit. This unit is operated during the spring and early summer months for the purpose of breaking out of the shell eggs that are to be frozen and held in that condition. Formerly this product was prepared largely to save eggs that were too weak or the shells of which were too badly damaged to enable them to be shipped safely to market. More recently the use of frozen egg products has increased to the point where current receipts are commonly broken out for the production of frozen eggs. Some eggs are also broken out in terminal markets; for the most part these are not frozen solid but are sold to bakers in liquid form in a chilled condition. Frozen eggs prepared in the United States consist of three products: Frozen whole eggs, frozen whites, and frozen yolks. These products are used largely by bakers, confectioners, and mayonnaise manufacturers.

In preparing frozen eggs, the shell eggs are first candled carefully to remove eggs unsatisfactory for inclusion in the frozen product. The remaining eggs are then sent to the breaking room where they are opened by experienced girl operators. The work is performed in a refrigerated room, finished in white, and kept scrupulously clean in order to keep down the bacterial content of the finished product. The girls are dressed in white uniforms and caps, and the utensils are sterilized in an adjoining room whenever they come in contact with a bad egg. The eggs are then judged by appearance and smell, and sometimes by taste, to determine their edibility.

From the cups, the eggs are emptied into a larger container, or if the eggs are to be separated into yolks and whites, this separation takes place as the eggs are opened. The broken-out products are mixed to a homogeneous consistency by means of a churn. The mixture is then drawn off into cans, each of which holds about 30 pounds of egg, and placed in a sharp freezer at a temperature of 0° F. or lower, where they are quickly frozen solid. The product is held in storage at a temperature of 0° or below, which insures its remaining in a hard frozen condition.

Practically no dried egg is prepared in the United States at this time, supplies of this product being imported largely from China. Considerable quantities of frozen whole eggs and frozen yolks are also imported.

### Grading Eggs and Poultry

Grading eggs and poultry is a necessary process incident to the successful marketing of these products. Grading consists in the sorting or separating of products of miscellaneous quality and condition into two or more lots or grades of greater uniformity, thus making it easier to determine their market value and also better adapting the product to the various market outlets available.

#### GRADING OF EGGS

When eggs are bought from producers on a quality basis, a preliminary grading takes place at that time. Usually, however, eggs get their first grading at the egg-packing house, where all bad eggs are thrown out and where the remaining eggs are graded into the various grades which may be put up by that particular packer. The eggs are usually candled again by the jobber after they arrive at the terminal market to remove any eggs which may have spoiled or become broken during transit, and in some cases to classify them further into grades which will make them especially well suited to the dealer's trade outlets. Another grading may take place in the hands of the retailer who desires to cater still more exactly to the tastes of his customers, but this grading is not common.

In the United States the principal consideration in grading eggs is interior quality, determined by the process known as candling. In candling, each egg in turn is held up to a hole about  $1\frac{1}{4}$  inches in diameter, cut in a circular metal screen, within which a bright light is located. The candling is done in a darkened room so that the light coming through the opening of the screen passes through the egg and illuminates it in such a manner as to reveal the condition of the contents satisfactorily to one experienced in candling, especially when the egg is rotated from side to side so as to expose its entire surface and contents to view.

Market standards for eggs vary somewhat in the different parts of the United States. The same grade names are used to a large extent in the different markets, but the quality of the eggs represented by them is not identical and may, in some instances, be considerably different. Grading in all the markets, however, is accomplished by the same means—by candling the eggs and by external inspection. Grading is also based upon the same basic factors of quality and value. Two general sets of factors are considered in grading. The first set has to do primarily with external characteristics which can be determined without candling. These are size or weight, color, uniformity of size and color, and condition of the shell.

Size or weight is an important factor in market value since the food value of a lot of eggs varies almost directly with the weight of the eggs. In most markets a minimum weight is provided for the different

grades, below which the eggs can not fall regardless of their interior quality, without the grading being lowered. Color is an important factor in some markets, but not important in others. New York City, for example, is a market where a premium is paid most of the year for white eggs of the better qualities as contrasted to eggs with brown shells. Uniformity of size, shape, and color affects the price which eggs will bring on the market to a considerable extent because of the more pleasing appearance which uniformity imparts to a lot of eggs. The condition of the shell may also affect price considerably. Clean shelled eggs, for example, bring a better price than dirty eggs, and eggs with shells which are free from cracks keep better than those that



FIGURE 47.—Candling is the most important operation in grading eggs for quality

are damaged. Decided irregularities or abnormalities of shell also affect values.

*Candling eggs.*—A second set of factors considered in grading eggs are factors affecting their internal quality. These are primarily the size and condition of the air cell, the condition of the white, the condition of the yolk, and the condition of the germ spot. All of these factors must be determined commercially by candling. (Fig. 47). Candling tests of interior quality emphasize the small size of the air cell in eggs of best quality, since this is a condition which is found in new-laid eggs. The increase in the size of the air cell as the egg ages and as evaporation of moisture takes place is considered to be an indication of a lowering in quality. An air cell which has a fixed position, usually in the large end of the egg, is also considered to be an evidence of superior quality as contrasted to an air cell which may show a slightly tremulous or movable condition.

In candling, the condition of the egg white and the condition of the yolk are considered together. As the egg deteriorates, the white tends to become thinner or more watery, and the yolk tends to become a little larger and the yolk membrane to become weaker. These conditions are generally considered to be indicated by the behavior and the degree of visibility of the yolk. Eggs in which the yolks are dimly visible are considered to be in good condition owing to a firm, thick white which tends to hold the yolk in the center of the egg. Progressively greater degree of visibility of the yolk and freer movement of the yolk are considered to be indications of deterioration in the condition of white and yolk. An important consideration in determining egg quality by candling is the condition of the germ spot. Whenever evidence of the development of the germ can be seen in candling through the appearance of a reddened area or spot on the yolk, it is concrete evidence of lower quality in the egg. As soon as this development has proceeded to the point where blood is visible, the egg is considered to be inedible.

*Commercial grades.*—In commercial grading, eggs are commonly classified according to certain conditions connected with their history or handling. Eggs may be classed, for example, as fresh or fresh gathered. The term "storage-packed eggs" is commonly applied to eggs which have been prepared for storage. The term "refrigerator" is commonly applied to eggs which have been held in cold storage. The term "processed" is applied to eggs which have been subjected to some process other than cold storage, intended to preserve the quality of the eggs. This term commonly refers to eggs which have been oil processed. Eggs may be also classed as hennery and as near-by. Hennery eggs indicate that the eggs have been shipped directly to the market from poultry farms on which they have been produced. Near-by eggs is a term applied to eggs which originate in the territory immediately surrounding the market in which the term is applied. Recently a method has been developed for cleaning eggs which consists of running them through a sand blast. The sand blast will remove most of the dirt and stain from lightly soiled eggs and will also remove the surface oil from oil-processed eggs. Such eggs may be referred to as sanded eggs.

The most common grade names used in the different markets are "extras", "extra firsts", "firsts" and "seconds", with separate designations for dirty eggs, usually as No. 1 and No. 2 dirties, and for cracks. Extras commonly represent the top commercial grade, and seconds the lowest grade. Further classification of any of these grades on a weight basis may also be made, eggs of intermediate size being termed "mediums" and eggs of smaller size being termed "pullets."

Official grades and classes of eggs for trading purposes in some of the larger markets are defined by the produce or mercantile exchange of those markets which deal in this product. The exchange generally provides facilities through a board room where eggs may be bought and sold by members at the regular daily trading sessions. In case dispute arises with respect to the grade of eggs sold through the exchange, an official inspection may be requested. This examination is made by an inspector employed by the exchange for that purpose. The inspector's findings determine the grade, and his results are binding upon the parties to the transaction, except that provision is made for reinspection or appeal inspection, which is the final settlement of the controversy. The exchanges also serve as meeting places for members of the trade, where the problems of the industry can be discussed and where expression may be given to ideas of value.

*Official grades.*—Because of differences in grades in different markets or in different sections of the country, and because of different interpretations of egg quality, there has arisen in the United States a need for standardized egg grades which are applicable in all sections of the country. In an effort to meet this need, the United States Department of Agriculture has formulated tentative United States standards and grades for eggs. These grades are based upon exactly the same quality factors previously discussed and which are used generally by the trade, and their determination is made by the same means. The general adoption of uniform national standards and grades for eggs is an educational process and has necessarily been slow. Nevertheless, these standards and grades are being used to an increasing extent and are the basis for much of the grading now being done in the United States.

#### GRADING OF POULTRY

The grading of dressed poultry is carried on primarily at the packing house where the poultry is dressed, and is done just prior to packing. (Fig. 48.) While the classes and grades for dressed poultry in common use vary somewhat in different sections of the country and also with individual packers, there is a fairly close agreement on the fundamentals involved. The usual classes of dressed chickens recognized in the United States are broilers, fryers, roasters, fowl, stags, capons, and old cocks or roosters. The broilers consist of young chickens weighing up to about  $2\frac{1}{2}$  pounds each. Fryers are the next size of young chickens which weigh between  $2\frac{1}{2}$  and  $3\frac{1}{2}$  pounds each. Roasting chickens are generally young males weighing 4 pounds each or over. Stags are young male chickens which have developed to the stage where they have begun to get hard meated and stringy and take on the characteristics of cock birds. Capons are males which have been unsexed in order to keep them soft meated and which are usually

grown to rather large size and heavy weight. Fowls, as known in the poultry trade, are mature hens. The mature male birds are called old cocks or roosters.

The most common classes of turkeys are old toms (males), old hens, young toms, and young hens. Ducks are generally classified as old and young. Geese are quite commonly marketed with the young and old together. Guinea fowl are commonly classified as old guineas or guinea hens, and young guineas or squab guineas. Pigeons are usually divided into the classes of squabs and pigeons, or mature birds. Classifications are also commonly made on the basis of the way the poultry is dressed, that is to say, dry picked, semi-scalded, or hard scalded; on the basis of the method of feeding, that is, either corn fed or milk fed; on the basis of packing, as dry packed

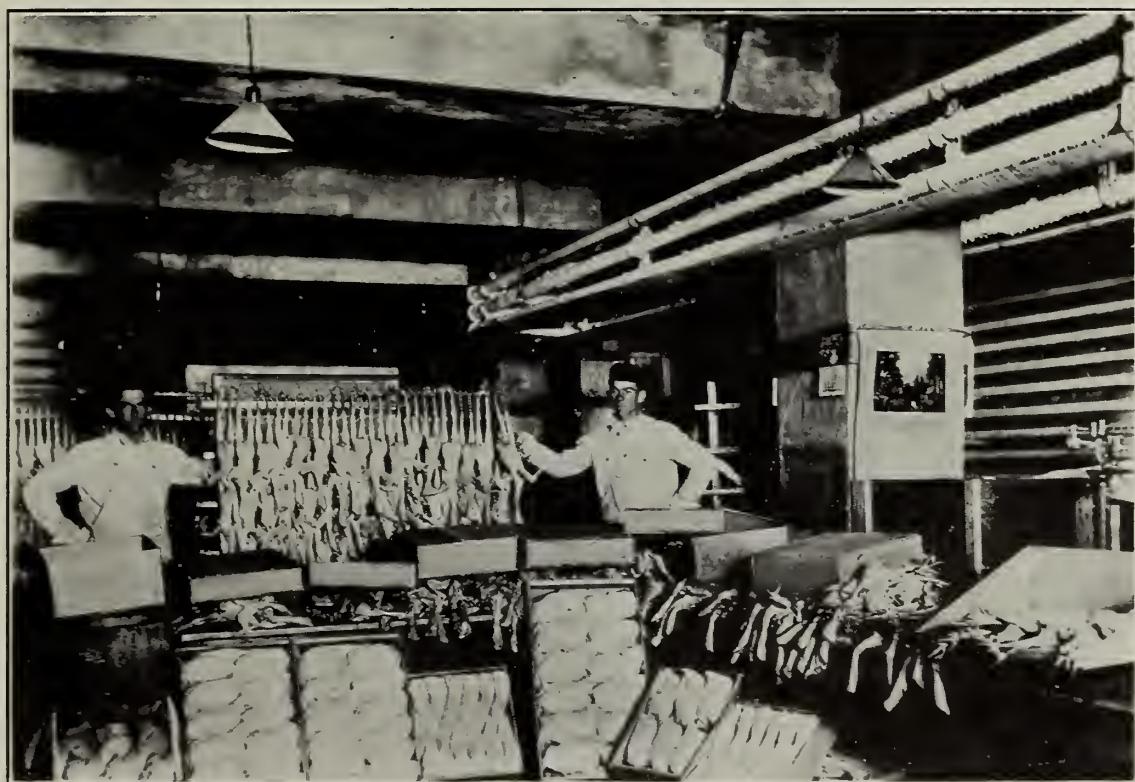


FIGURE 48.—Dressed poultry is graded for uniformity and packed in boxes holding 12 birds each

or ice packed; on the basis of freshness, that is to say, fresh dressed, fresh chilled, or frozen, and also at times on the basis of geographical origin.

In trade usage, three quality grades of dressed poultry are commonly employed. Various schemes have been adopted for differentiating these grades—by number, by letter, or by different brands or names applied to them by individual packers. The most important factor given consideration in determining grade is the fleshing condition of the birds. Birds of top quality must be full fleshed, that is, fully covered with flesh. The condition of the flesh and the color of the carcass also are considered from a quality standpoint. Birds of top quality must show every evidence of good workmanship, that is, they must be well bled, free from pinfeathers and from torn or

scuffed skin, and from deformities, abnormalities, or broken bones. As the grade lowers, fleshing does not need to be so full, and certain defects in workmanship and in finish are allowed.

Recently in an effort to bring about a more uniform system of grading dressed poultry, the Department of Agriculture has taken steps to standardize grades for this product. As a result, tentative United States standards and grades have been issued in which these same general characteristics have been considered in defining the grades.

Differences exist in different sections with respect to market preferences for dressed poultry. In some of the larger markets, such as New York City and Boston, dry picked or semiscalded poultry is preferred to the hard-scalded birds. In some cities, particularly the southern markets, this preference is much less marked, or may be absent.

At present, practically all of the dressed poultry is sold in an undrawn condition; that is, the dressing consists merely in bleeding the birds and in removing the feathers. In the last few years, however, considerable work has been done in the full drawing of poultry for sale. It has been found that if this work is carefully done under sanitary conditions, and if the birds are hard frozen immediately after drawing, they may be shipped to market satisfactorily and may even be held in cold storage without serious deterioration. At present this method of marketing poultry is not widespread, and its future development will depend upon the demand which can be created for such products.

#### CANNED POULTRY

Canned-poultry products have been prepared for some time, largely as various kinds of chicken soups, chicken à la king, deviled chicken, and chicken chop suey. Recently there has been developed a method of canning whole and half chicken which holds considerable promise for the expansion of the poultry-canning industry. These whole or half carcasses are cooked in the can and can therefore be quickly prepared for use on the table. The poultry-canning industry has increased considerably, and it is possible that this expansion will proceed still further.

Demand has arisen for inspection of the poultry used in many of these canneries to be sure that it is free from disease and otherwise wholesome for human food. The Department of Agriculture, to meet the demand for this service, is inspecting through its agents more than 2,000,000 pounds of poultry a month. (Fig. 49.) Canned-poultry products prepared from inspected poultry may show on the label affixed to the can the fact that it has been so inspected.

### Cooperative Marketing of Poultry Products

Producers have formed associations in various sections of the United States for the purpose of concentrating, grading, and, in some instances, marketing the eggs or poultry produced by them. More interest has been taken in the cooperative marketing of eggs than poultry, and a large volume of eggs is being handled in this manner. The formation and operation of cooperative poultry and egg marketing agencies have been due in part to dissatisfaction of producers with the marketing agencies that were already in existence.

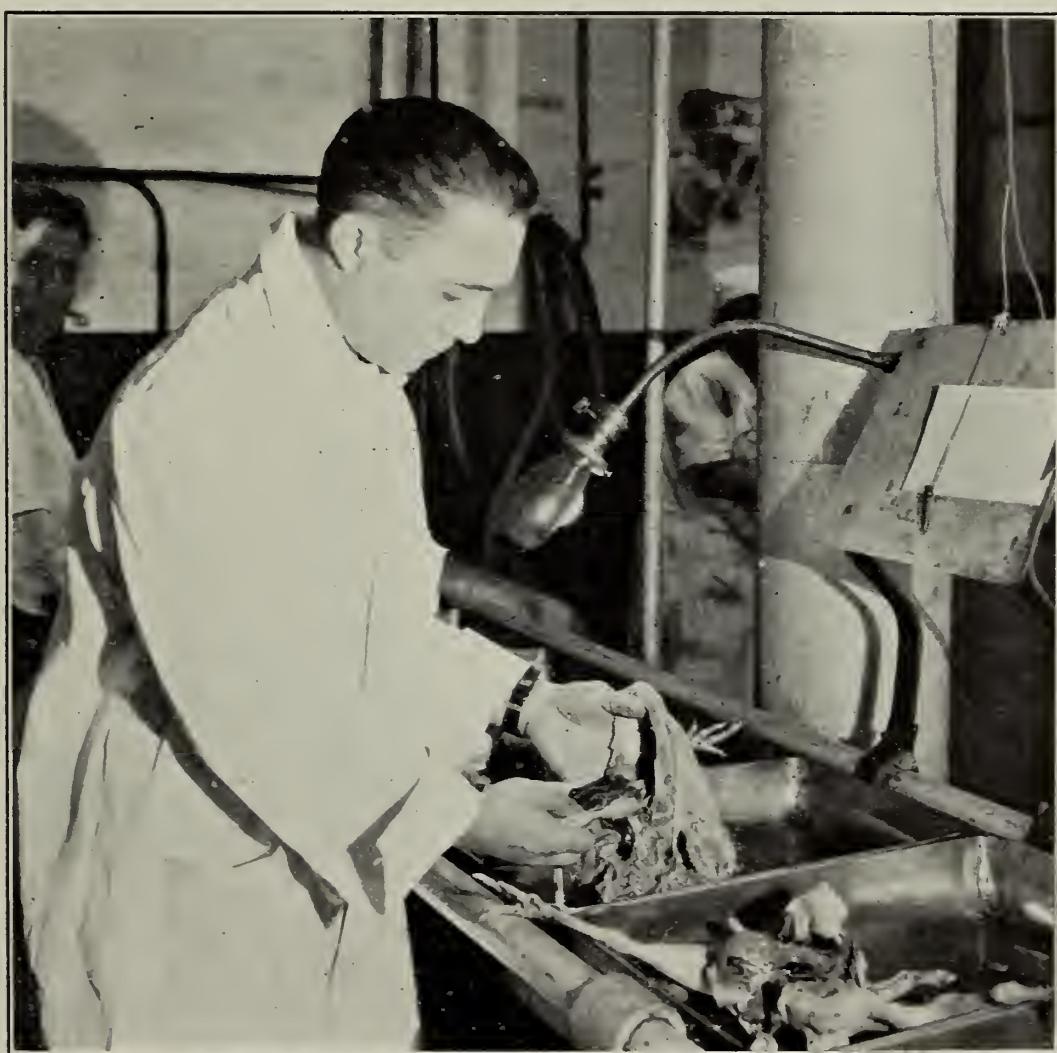


FIGURE 49.—The poultry used in most canning plants is at present inspected by the Department of Agriculture for condition and wholesomeness

Cooperative marketing of eggs has been developed to the greatest degree in the Pacific Coast States. In this area, egg production was greater than the market requirements, while the distance of these producing areas from the large eastern markets is entirely too great for individual producers to make shipments by express. In an effort to remove this surplus from the Pacific Coast States, cooperative egg-marketing associations, formed in that region, have developed the handling of the product of their members to a highly specialized degree, and have moved the surplus to eastern markets in car lots under refrigeration.

In certain sections there has been an extensive development of cooperative creameries. Some of these creameries have utilized their plants, facilities, and outlets to market eggs, as well as milk or cream, for their members. The marketing of eggs or poultry through cooperative creameries is, however, not extensive at this time except in certain areas.

The more permanent forms of cooperative marketing of eggs and poultry products are the cooperative associations specifically formed to handle poultry or eggs. Many of these have failed for one reason or another, but others have succeeded and have continued in business and expanded to considerable size. Of course, efficient management and a suitable form of organization have also been important factors in the successful operation of such associations.

#### METHODS OF OPERATION

In actual operation, the eggs or the poultry produced by individual members is delivered at the central plant of the association or brought to it through collection stations or through the operation of truck routes. Upon arrival at the central plant the product is graded and processed as may be necessary. All product of like quality received within a given length of time, usually a week, is pooled for marketing. Generally an advance is made to producers for the product delivered to the association, and further payments are made for the goods in each pool, if sales are made at prices which allow such additional payments. Certain sums are deducted from amounts received in order to meet overhead costs of the association, and if amounts accumulate in excess of necessary costs, these are eventually prorated back to the individual members.

In the Western States there has been an extensive development of local or State pools to handle the turkeys produced and dressed by members in such territory. These pools serve primarily in the capacity of concentration and collective bargaining agencies, the turkeys in each pool being sold usually at auction to the highest bidder.

There is a tendency at the present time for cooperative marketing organizations to engage to a greater extent in the function of market distribution. To accomplish this purpose, some of these organizations have set up sales agencies in the larger terminal markets through which to handle the product shipped there for sale. (Fig. 50.)

In some of the Southeastern States, where the extent of the poultry industry is limited and poultry dealers are not available in many of the smaller places, markets for poultry have in many cases been somewhat unsatisfactory. To take care of this situation, there has been developed a cooperative method of marketing live poultry. Usually the State or the county agricultural agent has cooperated

in this work. Through it, live-poultry cars have been advertised to be at certain points on given dates, and farmers interested in selling any live poultry have been able to bring their poultry in and sell it for cash at the car. The carloads of poultry so obtained are sold to dealers who have previously bid for the car and who pay cash at the car. Hundreds of carloads have been shipped out of the Southeastern States and have helped to provide a ready cash market for the surplus poultry produced in these areas.

### Prices of Poultry Products

In a country as large as the United States and with the multitude of different conditions existing, there is a very wide range in the prices obtainable by producers for poultry and eggs. Prices may at



FIGURE 50.—One of the live poultry terminals at New York City, the largest poultry market in the United States

times vary widely even within comparatively small areas. In general, it may be said that prices received for poultry products raised in sections close to the larger consuming markets are consistently higher than prices realized by producers in more remote sections. This variation in price between sections is, as a rule, greater with eggs than with poultry, owing to the greater amount of deterioration which may take place in the summer and which results in a less uniform quality upon reaching the markets.

Wholesale prices in the larger consuming markets determine to a large extent the prices paid to producers in the country. Producers' prices are, however, affected by a multitude of other factors. Seasonal production affects price, resulting in lower prices during the season of flush production and usually higher prices for the fresh

product in seasons of scarce production. Distance from market also affects producers' prices since the cost of transporting the goods to market varies with the distance from the market. The quality of the product from individual producers where goods are bought on a quality basis affects price, and the average quality of the product from a section or a State may have a considerable influence upon the average price paid there. Competitive outlets available also affect prices as does the amount of competition existing between buyers.

Wholesale prices of poultry products as determined in the large consuming markets are affected by the supply of the fresh product coming currently to the market, by the demand that exists either for immediate consumptive needs or for speculation, and by the quantity of the products in storage. Wholesale prices may also react sharply to temporary shortages in supplies or to unusually heavy receipts. Sentiment plays its part in the determination of wholesale prices, and reports of production conditions or generally held opinions with respect to probable future production may be important price influences. Wholesale price quotations are published in the larger consuming markets for the different classes and qualities of poultry and eggs. Trained market reporters are employed both by commercial agencies and by the Department of Agriculture to determine what these price quotations should be. These trained market reporters make a practice of interviewing the individuals in the trade and sum up the actual market value of poultry products from a careful study of sales of these products which have been made.

As might be expected, retail prices in the consuming markets bear a close relationship to wholesale prices. However, the margin of profit charged by different retailers varies with the retailer, with the grade of the product handled, with the locality in which the retailer does business, and also with the level of wholesale prices at different seasons. Minor fluctuations in wholesale price are not always reflected in corresponding changes in the retail price. Advances in wholesale prices are more likely to be promptly reflected in advances in retail prices than are slight declines in wholesale price. Keen competition among retailers, however, tends to hold retail prices rather well in line with existing wholesale prices.

### Exports and Imports

Exports and imports of eggs are of relatively small volume in this country when compared with the total volume of domestic production. During 1929 the total imports of shell eggs amounted to 307,912 dozen, with a value of \$90,602, while the imports of dried or preserved eggs and egg yolks amounted to 21,830,094 pounds, with a value of \$6,649,001, and of egg albumen 4,199,965 pounds, with a

value of \$1,844,357. During the same year the estimated farm production of chicken eggs in the United States was 2,612,000,000 dozen, with a value of \$777,000,000. China is the country from which the largest quantity of frozen and dried eggs came, while the greatest quantities of shell eggs were imported from Hong Kong, Canada, and China. Aside from China, the only country from which dried and frozen eggs were imported in large quantities was England.

Of the dried, frozen, and canned eggs imported, 657,517 pounds, with a value of \$186,207, and of egg albumen 96,911 pounds, with a value of \$42,287, were again exported instead of being used in the United States.

Exports of domestic eggs in the shell amounted to 12,074,830 dozen, with a value of \$4,081,363. These eggs went principally to Cuba, Mexico, and Canada, with smaller quantities to the United Kingdom, Panama, and to various other countries including several in South America. Exports of domestic eggs and yolks, frozen, dried, or canned, amounted to 325,706 pounds, valued at \$61,644. Because of the different forms in which the exported and imported eggs are moved, and lack of information as to the quantity of each, it is impossible to compare the quantities exported and imported. A comparison of values, however, can be made. Deducting from the value of all forms of imported eggs the value of such of these as were again exported, there was a net value of imports amounting to \$8,355,466, compared with a value of domestic exports amounting to \$4,143,007, or an excess in value of imports over exports of \$4,212,459.

### POULTRY BY-PRODUCTS

Feathers and manure are by-products of the poultry industry and have a commercial value of considerable importance. Feathers are used in the manufacture of millinery specialties and in the making of pillows, cushions, mattresses, dusters, artificial flowers, and for sundry other purposes. The value of feathers is affected by the class of birds producing them and by the color. Goose and duck feathers are more valuable than chicken or turkey feathers, and white feathers always command a higher price than colored ones. Certain kinds of feathers, such as tail feathers, are much more valuable than body feathers. Little attention is given to the production and use of feathers on small poultry farms or on general farms and they are rarely saved except where they are produced in large quantities. The producers merely dry the feathers enough so they can be shipped to market where they are cleaned, cured, and prepared for use by commercial feather companies.

By reason of its value as fertilizer, poultry manure is a noteworthy by-product of the industry. It is used commonly either on the farms

where it is produced or sold in the locality. A few of the large poultry-fattening stations have installed equipment for drying poultry manure so that it can be shipped. This has been done largely as a means of disposing of this product rather than because of any material profit.

### RESEARCH AND SCIENCE

A great amount of research work in poultry investigations is conducted at the State experiment stations and by the Federal Government. Each of the 48 States maintains at least one agricultural experiment station at which poultry problems are investigated. The United States Department of Agriculture has three experiment farms where poultry research investigations are in progress. Part of the money for the support of the State experiment stations comes from the Federal Government, the remainder coming from the State governments, with a very small percentage from private or commercial sources.

In 1928, the State experiment stations received \$3,360,000 from the Federal Government and \$11,442,773 from State sources, a total of nearly \$15,000,000. A rather small percentage of this total is spent strictly on poultry husbandry but, including other lines which indirectly affect poultry, such as nutrition, breeding, agricultural economics, and genetics, the total sum used in some kind of poultry work is large. For the fiscal year 1930 the Federal Government allotted \$191,386 for poultry and egg research in the United States Department of Agriculture and contributed \$244,000 to the States for this research work, a total of nearly half of a million dollars from Federal funds alone.

Poultry investigations include a very large and varied list of projects. Nutrition projects are probably the most extensive, covering investigations in feeding both growing chickens and hens, protein and mineral studies, vitamins in poultry feeds, fattening rations, the use of by-products and local feeds, and a study of green feeds. (Fig. 51.)

A great variety of projects including various phases of breeding work (fig. 52) are in progress, dealing primarily with breeding for egg production and including studies of genetics and inheritance of characters. Disease problems probably come next in the relative amount of attention received. Pullorum disease (bacillary white diarrhea), coccidiosis, and chicken pox are some of the diseases which are being studied most extensively. The effect of both internal and external parasites on the health of poultry receives careful study. Incubation, including embryology of the egg and hatchability, has recently been given more careful research and many methods of brooding chickens (fig. 53) are being compared.

Management, as affecting costs of production, cost of broiler raising, and marketing phases of poultry work, has received consider-



FIGURE 51.—House and small concrete yards used in feeding experiments at the United States Animal Husbandry Experiment Farm, near Washington, D. C.

able attention in recent years. Some data on the ventilation of poultry houses and the effect of heating and lighting are being obtained.



FIGURE 52.—A group of poultry houses used in breeding investigations at the United States Animal Husbandry Experiment Farm

Turkey production is another branch of poultry raising that is receiving careful study, most of this work having been begun recently. Only a very few projects include pigeons, while practically no research

work by the experiment stations is devoted to ducks, geese, or guinea fowls.

Research in poultry ranges from relatively simple tests and observations, mostly routine in nature, to the most advanced types of original research. Most of the poultry work of the past has been confined to the simpler types of research, but there is now a very decided trend toward more fundamental research. As used in this discussion, research implies the gathering of data for a particular purpose, guided by the investigator's ability to discern the kind of data necessary and to interpret this material rather than merely to summarize the results. Many poultry projects are now in progress which will add substantial general understanding of the relationship



FIGURE 53.—Brooder houses in the open at the United States Animal Husbandry Experiment Farm

between cause and effect and are no longer limited to comparative results good only for a particular time or place.

As a result of the extensive poultry research work conducted at the experiment stations, a large number of popular and scientific bulletins are published each year. The United States Department of Agriculture has about 20 popular or Farmers' Bulletins on poultry subjects available for general distribution, in addition to several scientific bulletins, which receive only limited distribution. Each year over 100,000 of several of the most popular Farmers' Bulletins on poultry are distributed free by the department. The State experiment stations issue bulletins primarily for distribution to residents of their respective States, and each year over 2,000 such publications are published on agriculture, of which poultry is one of the most popular lines. These stations have a combined mailing list of nearly 1,000,000 names to whom these bulletins are sent free.

All this research and educational work in poultry husbandry has been built up within a comparatively few years. Instruction in

poultry raising at an agricultural college was begun in 1890, but most of the poultry work has been built up during the last 25 years. Regular poultry instruction is given in all of the State colleges of agriculture, in many secondary agricultural schools, and in the agricultural high schools. Intensive short courses in poultry raising, varying from one week to three months in length, are given at many of these colleges and schools.

### Poultry Organizations

The development of the industry is aided and sponsored by numerous organizations of poultrymen and specialists in various fields.

Among the principal poultry organizations are the American Poultry Association, the International Baby Chick Association, the National Poultry Council, the Poultry Science Association, the National Poultry, Butter and Egg Association, and the United States Egg Society. These organizations are influential in shaping the policies and promoting the growth of the poultry industry.

The American Poultry Association, the oldest of the organizations mentioned, is composed of poultry breeders who have built up the standardbred-poultry industry of the country, and this has served as a foundation for subsequent poultry development. This association sponsors and issues the American Standard of Perfection and stimulates interest in new breeds of poultry and in the exhibition and improvement of all breeds. The International Baby Chick Association, composed of hatcherymen, was organized in 1916 and has greatly influenced both the growth of the hatchery industry and the quality of the chicks produced. The National Poultry Council is made up of representatives of the various organizations and of all poultry interests, and helps to direct and correlate developments of the entire industry. Federal and State workers in research, education, and extension make up the Poultry Science Association, while the National Poultry, Butter and Egg Association is made up of those companies engaged in the marketing and storing of poultry and eggs. The United States Egg Society is composed of individuals and companies interested in educational work in the market-egg and poultry industry. The associations are interested likewise in poultry subjects of international significance. There are also many other organizations which promote the interests of various breeds, stimulate the local development of poultry raising, and conduct market activities.

### EXTENSION WORK

Poultry extension work is conducted by both educational and commercial agencies. The educational field is covered in all the 48 States by the United States Department of Agriculture in cooperation with the State agricultural colleges and county extension workers.

In recent years county extension workers, numbering about 3,600, have spent approximately 8 per cent of their time on poultry. These workers include agricultural agents, junior club agents, and home demonstration agents. Directing the county poultry work there have been about 75 poultry specialists who give their entire time to this subject, and in addition 18 others who devote time to poultry extension teaching. The county extension workers live in the area in which they are employed, while the State specialists usually make their headquarters at the college and travel throughout the entire State. Both the county and State workers are coming to be recognized as part of the agricultural college faculties. In doing this, the



FIGURE 54.—A county agent discussing poultry management with a flock owner

authorities realize that such workers (fig. 54) are teachers even though their classrooms are not located at the colleges.

The recommended practices in poultry husbandry are carried to the farmers through a large variety of ways and agencies. Demonstration meetings and extension schools are frequently held. It is here that the improved practices of poultry raising are explained, questions answered, and bulletins and other literature distributed to interested persons. Charts, lantern slides, and motion pictures are often used to illustrate important points. Among its extensive collection of films on agricultural subjects the United States Department of Agriculture has prepared and distributed 13 reels of motion pictures which illustrate modern practices of poultry raising.

Radio broadcasting has recently come into general use in getting information to the public and both the United States Department of



FIGURE 55.—A satisfied poultry-club member and his flock

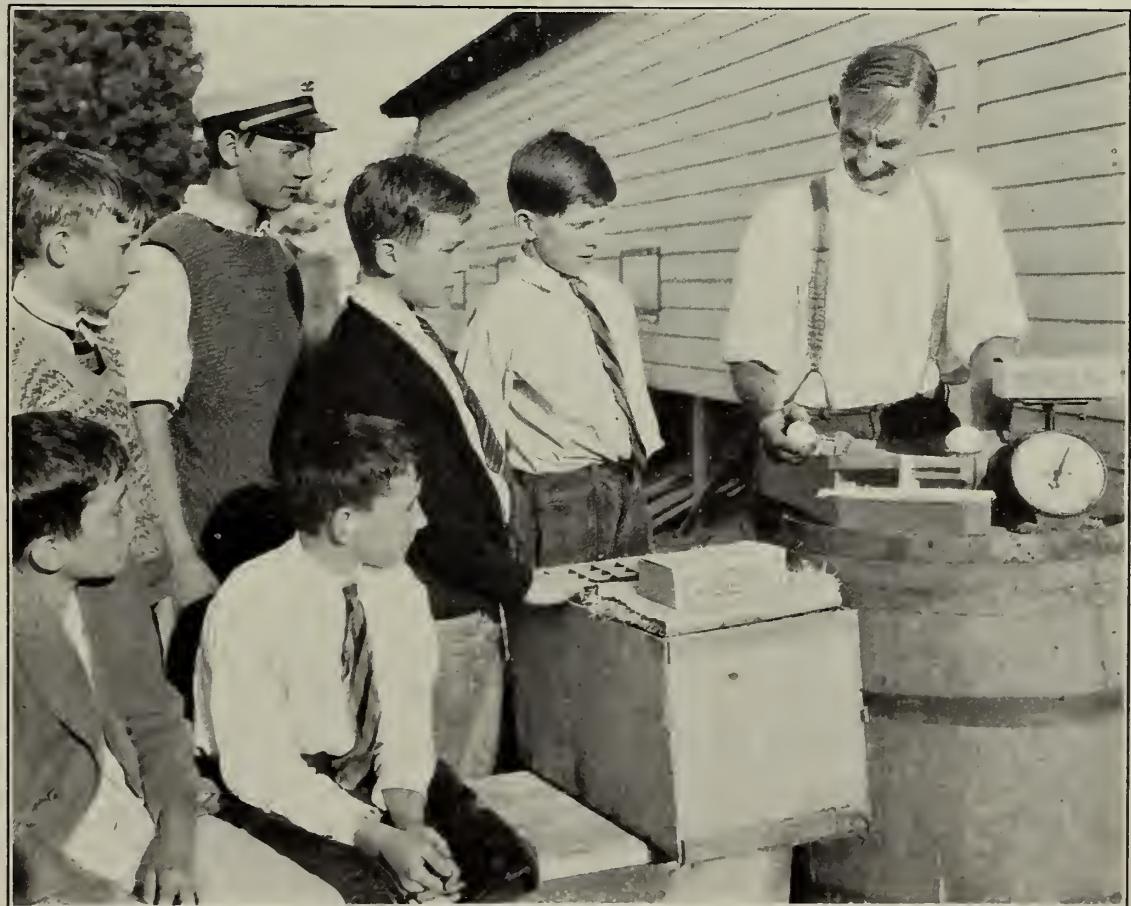


FIGURE 56.—A poultry-club leader giving instruction in grading eggs

Agriculture and the State colleges of agriculture regularly prepare radio programs which are broadcast over extensive radio systems. Poultry is one of the most popular agricultural subjects broadcast over the radio.

In 29 States, demonstration farm flocks have been established. These flocks are managed in accordance with modern methods, and a detailed monthly report of the income and outgo from the poultry enterprise is kept. Such farms are looked upon in the community as examples of good poultry practices and their influence in the community has been very remarkable.

The rising generation of farmers and poultry raisers is also receiving instruction by the extension service. (Figs. 55, 56, 58.) In recent years nearly 100,000 boys and girls have been enrolled in poultry clubs; these club members raised over a million birds annually, feeding and taking complete care of them. In addition to their work with the birds, they held club meetings where they studied profitable poultry production and gave public exhibitions, demonstrating some of their methods of selection, feeding, culling, and management. County, State, and national judging contests were held, thus helping to train the boys and girls in selecting birds for breeding and exhibition.

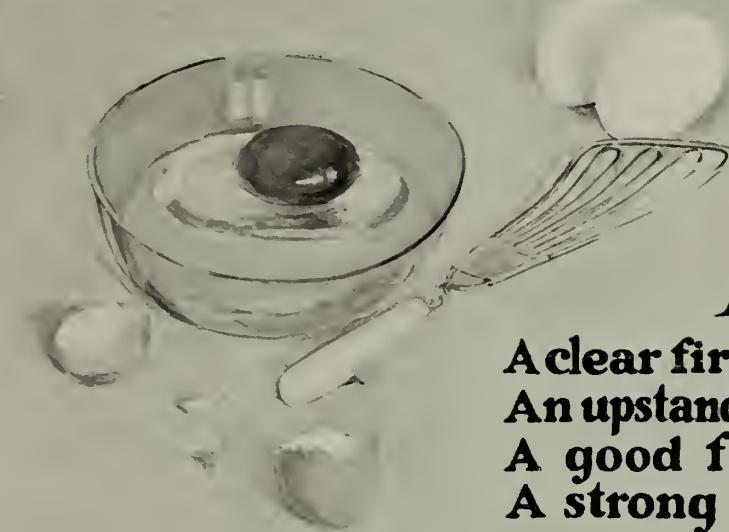
The extension work carried out by commercial and allied agencies is also important in the upbuilding of the poultry industry. For example, when practical methods of detecting low-producing hens by their physical characteristics was discovered, the extension workers held large numbers of culling demonstrations. These have gradually led, in some States, to the organization of flock-improvement associations. These organizations have their own paid managers and paid cullers who visit the members of the association and select the best birds in the flocks. The cullers instruct the owners in proper feeding and management. Many of these associations are connected with large commercial hatcheries and sell hatching eggs.

Manufacturers of commercial feeds for poultry have found that it is advantageous for them to carry on an educational program to show the farmers that flocks should be properly fed. These concerns employ well-trained men, usually former extension workers, to make these contacts with the producers and thus develop good will toward the particular brand of feed sold and also to show the importance of proper nutrition in egg and poultry production.

Some of the business organizations that purchase poultry and eggs from farmers have found it to their advantage to employ service men who visit the farmers and assist them in solving their poultry problems. These concerns also supply the farmers with literature from authentic sources.

Many of the large railroad companies have especially equipped educational trains which follow a regular schedule, visiting impor-

# DO YOU KNOW A GOOD EGG?



*It has*  
**A clear firm white  
An upstanding yolk  
A good flavor  
A strong shell**

*Look for these qualities and  
encourage the*  
**PRODUCTION & MARKETING  
of**  
**BETTER EGGS**



**CONSERVE FOOD VALUE AND GOOD FLAVOR  
BY KEEPING EGGS IN A CLEAN COOL PLACE**

**U.S. DEPARTMENT OF AGRICULTURE  
WASHINGTON D.C.**



FIGURE 57.—A facsimile of educational poster used to encourage the production and marketing of better eggs. This poster, used largely in extension work, is attractively printed in colors

tant poultry and egg shipping points. The schedules of such trains are widely advertised. These moving schools are usually manned by the best poultry authorities and lecturers obtainable. Attractive exhibits, posters (fig. 57), and other educational material carried on the trains, teach profitable poultry practices.



FIGURE 58.—A poultry specialist giving a talk on poultry raising to club members attending the National 4-H Club Camp at Washington, D. C.

Through the various means described, farmers of the United States have excellent opportunities to obtain valuable information on the best methods of egg and poultry production and marketing.

### STATISTICS OF THE INDUSTRY

TABLE 3.—*Monthly farm prices of chickens, 1920–1929*

[United States averages, cents per pound]

| Year beginning | July<br>15 | Aug.<br>15 | Sept.<br>15 | Oct.<br>15 | Nov.<br>15 | Dec.<br>15 | Jan.<br>15 | Feb.<br>15 | Mar.<br>15 | Apr.<br>15 | May<br>15 | June<br>15 | Weighted<br>average |
|----------------|------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------|-----------|------------|---------------------|
| 1920           | 28.4       | 26.6       | 26.9        | 24.6       | 22.9       | 20.6       | 21.7       | 22.3       | 22.8       | 22.2       | 21.8      | 21.5       | 22.8                |
| 1921           | 21.7       | 21.4       | 20.2        | 19.1       | 18.6       | 18.2       | 18.9       | 19.0       | 19.4       | 20.0       | 20.2      | 20.6       | 19.3                |
| 1922           | 20.7       | 18.9       | 18.6        | 18.1       | 17.2       | 17.2       | 17.3       | 18.6       | 18.8       | 19.4       | 20.1      | 20.3       | 18.2                |
| 1923           | 20.6       | 19.8       | 19.7        | 19.0       | 17.7       | 16.6       | 17.5       | 18.2       | 18.9       | 19.4       | 20.3      | 20.5       | 18.3                |
| 1924           | 20.2       | 20.0       | 19.8        | 19.4       | 18.5       | 17.9       | 18.5       | 19.1       | 20.0       | 21.1       | 22.0      | 21.6       | 19.2                |
| 1925           | 21.4       | 20.8       | 20.4        | 20.0       | 19.2       | 19.5       | 20.9       | 21.5       | 21.9       | 23.1       | 23.7      | 23.9       | 20.7                |
| 1926           | 23.6       | 22.1       | 21.4        | 20.8       | 20.0       | 19.8       | 20.1       | 21.1       | 21.3       | 21.8       | 21.7      | 20.2       | 20.7                |
| 1927           | 19.9       | 19.7       | 19.4        | 19.7       | 19.4       | 19.2       | 19.6       | 20.1       | 20.1       | 20.8       | 21.5      | 21.5       | 19.8                |
| 1928           | 21.9       | 21.6       | 22.3        | 22.0       | 21.5       | 21.2       | 21.6       | 22.1       | 22.7       | 23.8       | 24.4      | 24.6       | 22.1                |
| 1929           | 23.7       | 22.7       | 22.4        | 21.5       | 20.3       | 19.1       | 19.8       |            |            |            |           |            |                     |

TABLE 4.—*Monthly farm prices of eggs, 1920–1929*

[United States averages, cents per dozen]

| Year beginning | Apr.<br>15 | May<br>15 | June<br>15 | July<br>15 | Aug.<br>15 | Sept.<br>15 | Oct.<br>15 | Nov.<br>15 | Dec.<br>15 | Jan.<br>15 | Feb.<br>15 | Mar.<br>15 | Weight<br>ed<br>averag |
|----------------|------------|-----------|------------|------------|------------|-------------|------------|------------|------------|------------|------------|------------|------------------------|
| 1920           | 36.6       | 37.5      | 35.9       | 37.8       | 42.5       | 48.6        | 54.6       | 62.9       | 67.1       | 54.5       | 31.0       | 26.8       | 39.3                   |
| 1921           | 20.5       | 19.4      | 20.1       | 24.3       | 28.9       | 30.9        | 39.4       | 50.0       | 51.1       | 31.7       | 31.4       | 19.5       | 25.3                   |
| 1922           | 20.0       | 20.9      | 20.2       | 20.3       | 20.6       | 27.3        | 34.6       | 43.6       | 47.2       | 37.8       | 29.9       | 25.4       | 24.7                   |
| 1923           | 21.6       | 21.8      | 20.9       | 21.3       | 23.6       | 29.8        | 34.6       | 45.6       | 45.5       | 35.4       | 33.6       | 20.4       | 25.2                   |
| 1924           | 19.1       | 19.8      | 21.1       | 22.8       | 26.1       | 31.8        | 38.2       | 45.8       | 49.9       | 48.6       | 35.7       | 23.9       | 26.1                   |
| 1925           | 24.2       | 24.8      | 26.1       | 27.9       | 30.0       | 31.1        | 37.7       | 46.8       | 48.1       | 36.3       | 28.9       | 24.1       | 28.3                   |
| 1926           | 24.8       | 25.2      | 25.7       | 25.7       | 26.4       | 31.5        | 36.8       | 44.9       | 47.6       | 36.9       | 29.0       | 20.8       | 27.5                   |
| 1927           | 20.3       | 19.8      | 17.8       | 20.7       | 23.4       | 29.4        | 35.6       | 41.6       | 43.3       | 38.2       | 29.1       | 23.4       | 24.2                   |
| 1928           | 22.8       | 24.2      | 23.9       | 25.6       | 27.4       | 31.4        | 34.9       | 39.6       | 42.9       | 33.0       | 31.9       | 28.0       | 27.4                   |
| 1929           | 23.0       | 24.4      | 26.1       | 27.2       | 29.8       | 33.9        | 38.4       | 44.2       | 45.8       | 38.4       | —          | —          | —                      |

TABLE 5.—*Receipts of dressed poultry at four markets, 1929*

| Month     | New York    | Chicago    | Philadelphia | Boston     | Total       |
|-----------|-------------|------------|--------------|------------|-------------|
|           | Pounds      | Pounds     | Pounds       | Pounds     | Pounds      |
| January   | 14,221,137  | 7,712,259  | 2,547,792    | 4,586,359  | 29,067,547  |
| February  | 10,899,837  | 3,468,909  | 1,851,050    | 3,230,501  | 19,450,297  |
| March     | 9,964,381   | 2,707,245  | 1,679,684    | 2,315,181  | 16,666,491  |
| April     | 9,520,068   | 2,725,271  | 1,471,226    | 2,855,159  | 16,571,724  |
| May       | 10,233,014  | 2,811,203  | 1,556,983    | 2,717,766  | 17,318,966  |
| June      | 11,876,234  | 3,270,255  | 1,663,091    | 3,369,293  | 20,178,873  |
| July      | 13,077,991  | 3,519,828  | 2,133,964    | 3,152,500  | 21,884,283  |
| August    | 15,706,803  | 3,984,120  | 2,318,714    | 3,627,990  | 25,637,627  |
| September | 16,557,423  | 4,710,423  | 2,302,175    | 4,308,747  | 27,878,768  |
| October   | 20,601,916  | 9,069,677  | 2,541,361    | 5,048,027  | 37,260,981  |
| November  | 31,495,281  | 25,577,583 | 6,002,320    | 8,825,792  | 71,900,976  |
| December  | 32,902,886  | 23,811,452 | 8,595,239    | 10,395,190 | 75,704,767  |
| Total     | 197,056,971 | 93,368,225 | 34,663,599   | 54,432,505 | 379,521,300 |

TABLE 6.—*Receipts of live poultry at New York during 1929*

| Month    | By express | By<br>freight <sup>1</sup> | Month     |      | By express | By<br>freight <sup>1</sup> |
|----------|------------|----------------------------|-----------|------|------------|----------------------------|
|          |            |                            | Pounds    | Cars |            |                            |
| January  | 711,382    | 854                        | August    | —    | 1,145,511  | 893                        |
| February | 491,040    | 733                        | September | —    | 759,536    | 912                        |
| March    | 805,151    | 760                        | October   | —    | 968,699    | 1,126                      |
| April    | 622,687    | 955                        | November  | —    | 613,479    | 1,040                      |
| May      | 1,059,211  | 729                        | December  | —    | 511,057    | 1,087                      |
| June     | 1,560,128  | 650                        | Total     | —    | 10,790,901 | 10,493                     |
| July     | 1,543,020  | 754                        |           |      |            |                            |

<sup>1</sup> A carload comprises 18,000 to 20,000 pounds.TABLE 7.—*Receipts of eggs at four markets, 1929*

| Month     | New York  | Chicago   | Philadelphia | Boston    | Total      |
|-----------|-----------|-----------|--------------|-----------|------------|
|           | Cases     | Cases     | Cases        | Cases     | Cases      |
| January   | 394,406   | 205,822   | 118,351      | 132,812   | 851,391    |
| February  | 371,086   | 221,817   | 76,412       | 99,324    | 768,639    |
| March     | 820,754   | 553,968   | 168,423      | 190,399   | 1,733,544  |
| April     | 1,061,218 | 924,189   | 234,413      | 289,936   | 2,509,756  |
| May       | 998,991   | 798,927   | 219,871      | 233,499   | 2,251,288  |
| June      | 836,575   | 554,139   | 180,838      | 176,681   | 1,748,233  |
| July      | 668,165   | 341,937   | 156,040      | 176,097   | 1,342,239  |
| August    | 526,329   | 300,707   | 143,347      | 124,995   | 1,095,378  |
| September | 444,416   | 210,044   | 130,613      | 109,882   | 894,955    |
| October   | 379,867   | 135,248   | 93,859       | 77,409    | 686,383    |
| November  | 292,563   | 62,036    | 74,142       | 53,938    | 482,679    |
| December  | 334,975   | 89,254    | 100,813      | 53,136    | 578,178    |
| Total     | 7,129,345 | 4,398,088 | 1,697,122    | 1,718,108 | 14,942,663 |

TABLE 8.—*Average wholesale price of eggs per dozen, fresh firsts, at New York, 1920–1929*

| Year | Jan.  | Feb.  | Mar.  | Apr.  | May   | June  | July  | Aug.  | Sept. | Oct.  | Nov.  | Dec.  | Average |
|------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|---------|
|      | Cents   |
| 1920 | 71    | 59    | 48    | 44    | 44    | 43    | 47    | 51    | 57    | 64    | 77    | 78    | 57      |
| 1921 | 67    | 42    | 31    | 27    | 25    | 27    | 33    | 35    | 39    | 49    | 58    | 54    | 41      |
| 1922 | 41    | 38    | 25    | 26    | 27    | 25    | 24    | 26    | 39    | 43    | 53    | 53    | 35      |
| 1923 | 42    | 37    | 31    | 27    | 27    | 24    | 25    | 29    | 36    | 39    | 53    | 47    | 35      |
| 1924 | 42    | 39    | 25    | 24    | 25    | 27    | 28    | 33    | 39    | 44    | 52    | 57    | 36      |
| 1925 | 58    | 42    | 30    | 29    | 32    | 33    | 33    | 33    | 37    | 43    | 57    | 50    | 40      |
| 1926 | 38    | 31    | 29    | 30    | 31    | 30    | 29    | 31    | 37    | 41    | 51    | 49    | 36      |
| 1927 | 41    | 31    | 25    | 25    | 23    | 23    | 25    | 28    | 34    | 40    | 44    | 45    | 32      |
| 1928 | 47    | 34    | 29    | 28    | 30    | 29    | 30    | 31    | 33    | 33    | 37    | 36    | 32      |
| 1929 | 38    | 42    | 33    | 28    | 31    | 31    | 32    | 34    | 37    | 40    | 48    | 51    | 37      |

TABLE 9.—*Total United States holdings in cold-storage warehouses 1st of month, 1929*

| Month    | Eggs      | Frozen poultry, all classes | Frozen eggs | Month     | Eggs      | Frozen poultry, all classes | Frozen eggs |
|----------|-----------|-----------------------------|-------------|-----------|-----------|-----------------------------|-------------|
|          |           | Cases                       | Pounds      |           |           | Cases                       | Pounds      |
| January  | 1,415,000 | 109,684,000                 | 56,181,000  | July      | 8,510,000 | 42,001,000                  | 84,766,000  |
| February | 248,000   | 102,380,000                 | 48,055,000  | August    | 8,962,000 | 40,896,000                  | 91,488,000  |
| March    | 11,000    | 89,088,000                  | 38,250,000  | September | 8,547,000 | 49,010,000                  | 86,695,000  |
| April    | 559,000   | 68,728,000                  | 34,918,000  | October   | 7,195,000 | 61,976,000                  | 81,541,000  |
| May      | 3,952,000 | 52,901,000                  | 51,825,000  | November  | 4,930,000 | 86,873,000                  | 70,331,000  |
| June     | 6,705,000 | 41,643,000                  | 71,560,000  | December  | 2,631,000 | 115,876,000                 | 61,772,000  |

TABLE 10.—*United States imports of poultry products, by countries of origin, 1929, and total imports, 1928*

| Country             | Eggs in shell | Whole eggs, dried | Whole eggs, frozen | Yolks, dried | Yolks, frozen | Egg albumen, dried | Egg albumen, frozen |
|---------------------|---------------|-------------------|--------------------|--------------|---------------|--------------------|---------------------|
|                     | Dozen         | Pounds            | Pounds             | Pounds       | Pounds        | Pounds             | Pounds              |
| Denmark             |               |                   |                    |              |               |                    |                     |
| France              |               |                   |                    |              |               |                    |                     |
| Germany             | 1,500         | 30,400            | —                  | 42,200       | 98,415        | 40,200             | —                   |
| Netherlands         |               |                   |                    | 135,400      | 13,200        | 36,057             | —                   |
| United Kingdom      | 1,122         | 5,270,944         | —                  | 13,559       | 239,040       | 8,700              | 16,600              |
| Canada              | 56,642        | 60                | 2,800              | 1,330        | 600           | 600                | 35,490              |
| China               | 16,985        | 1,612,026         | 3,900,693          | 6,395,080    | 4,049,507     | 3,920,869          | 137,326             |
| Hong Kong           | 230,607       | 7,540             | 11,200             | —            | —             | —                  | —                   |
| All other countries | 1,056         | 900               | 5,800              | —            | —             | —                  | —                   |
| Total               | 307,912       | 1,642,426         | 9,180,137          | 6,606,039    | 4,401,492     | 4,010,549          | 189,416             |
| Total, 1928         | 285,864       | 1,835,060         | 11,124,402         | 4,463,987    | 3,029,392     | 2,370,945          | 649,903             |

U. S. Department of Commerce.

TABLE 11.—*United States exports of poultry products, by countries of destination, 1929, and total exports, 1928*

| Country        | Eggs in shell | Yolks dried | Country             | Eggs in shell | Yolks dried |
|----------------|---------------|-------------|---------------------|---------------|-------------|
|                | Dozen         | Pounds      |                     | Dozen         | Pounds      |
| Denmark        | 41            | —           | China               | 1,500         | —           |
| France         | 33            | 28,394      | Australia           | 31            | —           |
| Italy          |               | 50          | New Zealand         | 22,590        | 481         |
| Germany        | 11            | 12          | All other countries | 11,139,886    | 50,254      |
| Netherlands    | 8             | —           | Total               | 12,074,830    | 325,706     |
| United Kingdom | 138,988       | 1,109       | Total, 1928         | 20,191,627    | 508,210     |
| Switzerland    |               | —           |                     |               |             |
| Canada         | 771,742       | 245,406     |                     |               |             |

U. S. Department of Commerce.

TABLE 12.—*Imports and exports of eggs and poultry products, 1929*

[Compiled from official records of Bureau of Foreign and Domestic Commerce]

| Item                      | Imports   | Exports    | Item  | Imports   | Exports   |
|---------------------------|-----------|------------|---|-----------|-----------|
| Shell eggs—dozen—         | 307,912   | 12,074,830 | Egg albumen, frozen prepared or preserved—pounds— |           |           |
| Whole eggs, dried—pounds— | 1,642,426 |            | Live poultry—do—                                  | 189,416   |           |
| Whole eggs, frozen—do—    | 9,180,137 |            | Dressed poultry—do—                               | 1,503,467 | 448,611   |
| Yolks, dried—do—          | 6,606,039 | 325,706    | Poultry, prepared—do—                             | 5,196,809 |           |
| Yolks, frozen—do—         | 4,401,492 |            |   | 553,092   | 2,472,574 |
| Egg albumen, dried—do—    | 4,010,549 |            |   |           |           |

TABLE 13.—*Value of eggs produced and chickens raised, 1928*

[In thousands of dollars—i. e., 000 omitted]

| State          | Eggs   | Chickens raised | Total  | State          | Eggs  | Chickens raised | Total  |
|----------------|--------|-----------------|--------|----------------|-------|-----------------|--------|
| Iowa           | 43,834 | 32,917          | 76,751 | Maryland       | 8,170 | 5,887           | 14,057 |
| Missouri       | 41,745 | 30,541          | 72,286 | West Virginia  | 9,133 | 4,287           | 13,420 |
| Ohio           | 45,875 | 26,407          | 72,282 | Alabama        | 7,583 | 5,618           | 13,201 |
| Illinois       | 38,294 | 31,404          | 69,698 | Mississippi    | 7,161 | 5,387           | 12,548 |
| Pennsylvania   | 45,393 | 21,698          | 67,091 | Connecticut    | 7,196 | 4,027           | 11,223 |
| New York       | 39,450 | 14,883          | 54,333 | Colorado       | 6,952 | 4,253           | 11,205 |
| Indiana        | 29,987 | 24,250          | 54,237 | Massachusetts  | 7,518 | 3,648           | 11,166 |
| Kansas         | 30,900 | 22,320          | 53,220 | North Dakota   | 6,420 | 3,546           | 9,966  |
| Michigan       | 27,625 | 16,283          | 43,908 | Oregon         | 6,863 | 2,919           | 9,782  |
| Texas          | 26,500 | 16,244          | 42,744 | Maine          | 6,273 | 3,325           | 9,598  |
| California     | 32,364 | 9,946           | 42,310 | South Carolina | 4,356 | 5,009           | 9,365  |
| Minnesota      | 24,570 | 16,734          | 41,304 | Louisiana      | 3,867 | 3,626           | 7,493  |
| Wisconsin      | 24,419 | 13,447          | 37,866 | New Hampshire  | 4,655 | 2,769           | 7,424  |
| Nebraska       | 16,840 | 16,060          | 32,900 | Montana        | 4,816 | 2,079           | 6,895  |
| Oklahoma       | 17,100 | 14,466          | 31,566 | Idaho          | 4,410 | 2,093           | 6,503  |
| Virginia       | 16,311 | 11,771          | 28,082 | Florida        | 3,561 | 2,478           | 6,039  |
| Tennessee      | 15,891 | 11,072          | 26,963 | Utah           | 3,906 | 1,213           | 5,119  |
| Kentucky       | 14,468 | 11,384          | 25,852 | Vermont        | 2,741 | 1,748           | 4,489  |
| Washington     | 17,895 | 5,858           | 23,753 | Delaware       | 2,603 | 1,553           | 4,156  |
| New Jersey     | 13,253 | 7,805           | 21,058 | New Mexico     | 1,718 | 811             | 2,529  |
| North Carolina | 10,881 | 9,710           | 20,591 | Wyoming        | 1,631 | 886             | 2,517  |
| South Dakota   | 10,712 | 9,238           | 19,950 | Arizona        | 1,547 | 694             | 2,241  |
| Arkansas       | 9,215  | 7,195           | 16,410 | Rhode Island   | 1,426 | 685             | 2,111  |
| Georgia        | 8,446  | 7,796           | 16,242 | Nevada         | 629   | 240             | 869    |

TABLE 14.—*Value of chickens on farms, January 1, 1928*

| State        | Value             | State          | Value             | State          | Value             | State         | Value             |
|--------------|-------------------|----------------|-------------------|----------------|-------------------|---------------|-------------------|
|              | 1,000<br>dollars. |                | 1,000<br>dollars. |                | 1,000<br>dollars. |               | 1,000<br>dollars. |
| Iowa         | 27,166            | Oklahoma       | 11,360            | Alabama        | 4,750             | New Hampshire | 2,004             |
| Missouri     | 26,973            | Nebraska       | 10,340            | West Virginia  | 4,272             | Idaho         | 1,870             |
| Illinois     | 25,006            | Tennessee      | 10,334            | North Dakota   | 3,611             | Delaware      | 1,535             |
| Pennsylvania | 22,658            | Virginia       | 9,915             | South Carolina | 3,524             | Utah          | 1,354             |
| Ohio         | 22,215            | Kentucky       | 9,655             | Louisiana      | 3,303             | Vermont       | 1,352             |
| California   | 16,832            | North Carolina | 8,194             | Oregon         | 3,268             | New Mexico    | 828               |
| New York     | 16,808            | Washington     | 6,762             | Massachusetts  | 3,243             | Wyoming       | 762               |
| Kansas       | 16,779            | South Dakota   | 6,252             | Colorado       | 3,173             | Connecticut   | 3,040             |
| Texas        | 16,163            | New Jersey     | 6,076             | Maine          | 2,747             | Arizona       | 698               |
| Indiana      | 15,861            | Georgia        | 5,854             | Florida        | 2,267             | Rhode Island  | 659               |
| Michigan     | 13,932            | Arkansas       | 5,500             | Montana        | 2,221             | Nevada        | 274               |
| Wisconsin    | 13,023            | Mississippi    | 5,020             |                |                   | United States | 396,451           |
| Minnesota    | 12,256            | Maryland       | 4,762             |                |                   |               |                   |

TABLE 15.—*Chickens on farms, January 1, 1929*

[In thousands—i. e., 000 omitted]

| State             | Num-ber | State               | Num-ber | State               | Num-ber | State              | Num-ber |
|-------------------|---------|---------------------|---------|---------------------|---------|--------------------|---------|
| Iowa.....         | 32,005  | New York.....       | 13,980  | Alabama.....        | 6,237   | Connecticut.....   | 2,059   |
| Missouri.....     | 30,603  | California.....     | 13,770  | North Dakota.....   | 5,322   | Massachusetts..... | 1,991   |
| Illinois.....     | 27,148  | Nebraska.....       | 13,471  | West Virginia.....  | 4,643   | Maine.....         | 1,908   |
| Ohio.....         | 23,185  | Tennessee.....      | 12,712  | New Jersey.....     | 4,628   | Utah.....          | 1,700   |
| Texas.....        | 22,673  | Kentucky.....       | 11,063  | Maryland.....       | 4,511   | Delaware.....      | 1,389   |
| Kansas.....       | 22,409  | Virginia.....       | 9,879   | Colorado.....       | 4,502   | New Hampshire..... | 1,271   |
| Pennsylvania..... | 19,034  | North Carolina..... | 8,675   | Louisiana.....      | 4,307   | New Mexico.....    | 1,101   |
| Minnesota.....    | 17,411  | South Dakota.....   | 8,472   | South Carolina..... | 4,138   | Vermont.....       | 978     |
| Indiana.....      | 17,331  | Arkansas.....       | 8,401   | Oregon.....         | 3,729   | Wyoming.....       | 930     |
| Oklahoma.....     | 15,457  | Georgia.....        | 7,054   | Montana.....        | 2,863   | Arizona.....       | 676     |
| Michigan.....     | 14,503  | Washington.....     | 6,862   | Idaho.....          | 2,728   | Rhode Island.....  | 391     |
| Wisconsin.....    | 14,467  | Mississippi.....    | 6,584   | Florida.....        | 2,294   | Nevada.....        | 286     |









